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TM 9-1225

WAR DEPARTMENT

U.S. Dept of Army
TECHNICAL MANUAL

**ORDNANCE MAINTENANCE
BROWNING MACHINE GUN
CAL. .50, ALL TYPES**

APRIL 15, 1943



FOR ORDNANCE PERSONNEL ONLY

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1943

TECHNICAL MANUAL

ORDNANCE MAINTENANCE—BROWNING MACHINE GUN,
CALIBER .50, ALL TYPES

CHANGES }
No. 1 }

WAR DEPARTMENT,
WASHINGTON 25, D. C., 1 July 1943.

TM 9-1225, 15 April 1943, is changed as follows:

63. Miscellaneous.

g. Removal of oil and parts from oil buffer M2, heavy-barrel gun.

(1) (Superseded.) Some heavy-barreled machine guns have been found to operate sluggishly, due to insufficient reserve energy. The insufficient reserve energy may be caused by lack of lubrication, burred parts; or by the action of the oil buffer mechanism in the gun. If a heavy-barreled gun delivers the normal rate of fire (400 to 500 rounds per minute), the gun may be considered in good operating condition. If sluggish operation or stoppages are encountered, disassemble the gun and inspect all moving parts for rough surfaces, burs, or insufficient lubrication. If any of these conditions are found, they must be corrected. If the gun still operates sluggishly or if stoppages occur, the oil and the following parts (fig. 74) should be removed from the oil buffer:

Piece mark	Item	Quantity
A9279A -----	PACKING, oil buffer gland -----	1
A9297 -----	RING, oil buffer packing gland -----	1
A9360 -----	SCREW, oil buffer relief valve -----	1
A9299 -----	SPRING, oil buffer packing gland -----	1
A9393 -----	SPRING, oil buffer relief valve -----	1
A9528 -----	VALVE, relief, oil buffer -----	1

NOTE.—Previous instructions (par. 2, TB 1225-13) have directed removal of the oil buffer tube filler screws A9361. These screws are needed to prevent dirt and other extraneous matter from entering the oil buffer tube. Therefore, all oil buffers from which the screws have been removed should be cleaned and the screws replaced. This change supersedes information on this point in paragraph 2, TB 1225-13.

[A. G. 300.7 (17 Jun 43).] (C 1, 1 Jul 43.)

BY ORDER OF THE SECRETARY OF WAR:

G. C. MARSHALL,
Chief of Staff.

OFFICIAL:

J. A. ULIO,
*Major General,
The Adjutant General.*

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ORDNANCE MAINTENANCE

BROWNING MACHINE GUN CAL. .50, ALL TYPES

No. 2 }
CHANGES }

U.S. WAR DEPARTMENT,
WASHINGTON 25, D. C., 5 September 1943.

TM 9-1225, 15 April 1943, is changed as follows:

31. Head space adjustment and checking.

b. Adjustment for caliber .50, M2 aircraft machine guns.—The following instructions apply to caliber .50, M2 aircraft machine guns only:

(1) Pull the bolt back about 1 inch by means of the bolt handle or the extractor.

(2) Screw the barrel into the barrel extension (by applying a screw driver to the notches on the rear end of the barrel) until the recoiling parts will not go into battery position without being forced when the bolt is released. The recoiling parts are in battery when the barrel extension touches the trunnion block.

NOTE.—For ease in screwing the barrel into the barrel extension, remove the rear right-hand cartridge stop assembly.

(3) Screw barrel out of the barrel extension one notch at a time until the recoiling parts will just go into battery position when the bolt is released but is not forced forward.

NOTE.—Do not retract the bolt more than 1 inch when determining the point at which the recoiling parts will just go into battery position without being forced.

(4) When this point is found, retract the bolt and unscrew the barrel TWO more notches.

c. Adjustment for caliber .50 M2 heavy barrel machine guns.—Head space adjustment is made without removing working parts from the casing. To head space the caliber .50 HB, M2 gun, screw barrel by hand into barrel extension until it comes into contact with bolt. Check to make sure end of barrel extends through barrel extension. Then unscrew barrel two notches. If gun operates sluggishly, unscrew barrel one additional notch.

d. Adjustment for caliber .50, M2 water-cooled machine guns.—

(1) Raise the cover and retract the bolt about $\frac{1}{2}$ inch (no more),

(2) Screw the barrel into the barrel extension (by applying a screw driver to the notches on the rear end of the barrel) until the barrel comes into contact with the bolt.

(3) Check to make sure end of barrel extends through barrel extension.

(4) Then unscrew the barrel TWO notches.

(5) If the gun operates sluggishly, unscrew barrel one additional notch.

Subparagraphs *c*, *d*, and *e* are renumbered *e*, *f*, and *g*, respectively.

[A. G. 300.7 (2 Aug 43).] (C 2, 5 Sep 43.)

BY ORDER OF THE SECRETARY OF WAR:

G. C. MARSHALL,
Chief of Staff.

OFFICIAL:

J. A. ULIO,
Major General,
The Adjutant General.

TECHNICAL MANUAL

ORDNANCE MAINTENANCE

BROWNING MACHINE GUN CAL. .50, ALL TYPES

CHANGES }
No. 3 }

115 WAR DEPARTMENT,
WASHINGTON 25, D. C., 15 October 1943.

TM 9-1225, 15 April 1943, is changed as follows:

21. Oil buffer group disassembly and assembly.

* * * * *

b. Assembly.—Present manufacture of heavy barrel guns is omitting the oil buffer gland packing, packing gland ring, packing gland spring, relief valve, relief valve spring, relief valve screw, and oil in addition to the oil buffer piston valve assembly. (Refer to paragraph 63*g* and figure 112 for details.)

* * * * *

[A. G. 300.7 (25 Sep 43).] (C 3, 15 Oct 43.)

*The individual items in this change will be cut apart and pasted over the specific paragraphs or subparagraphs affected.

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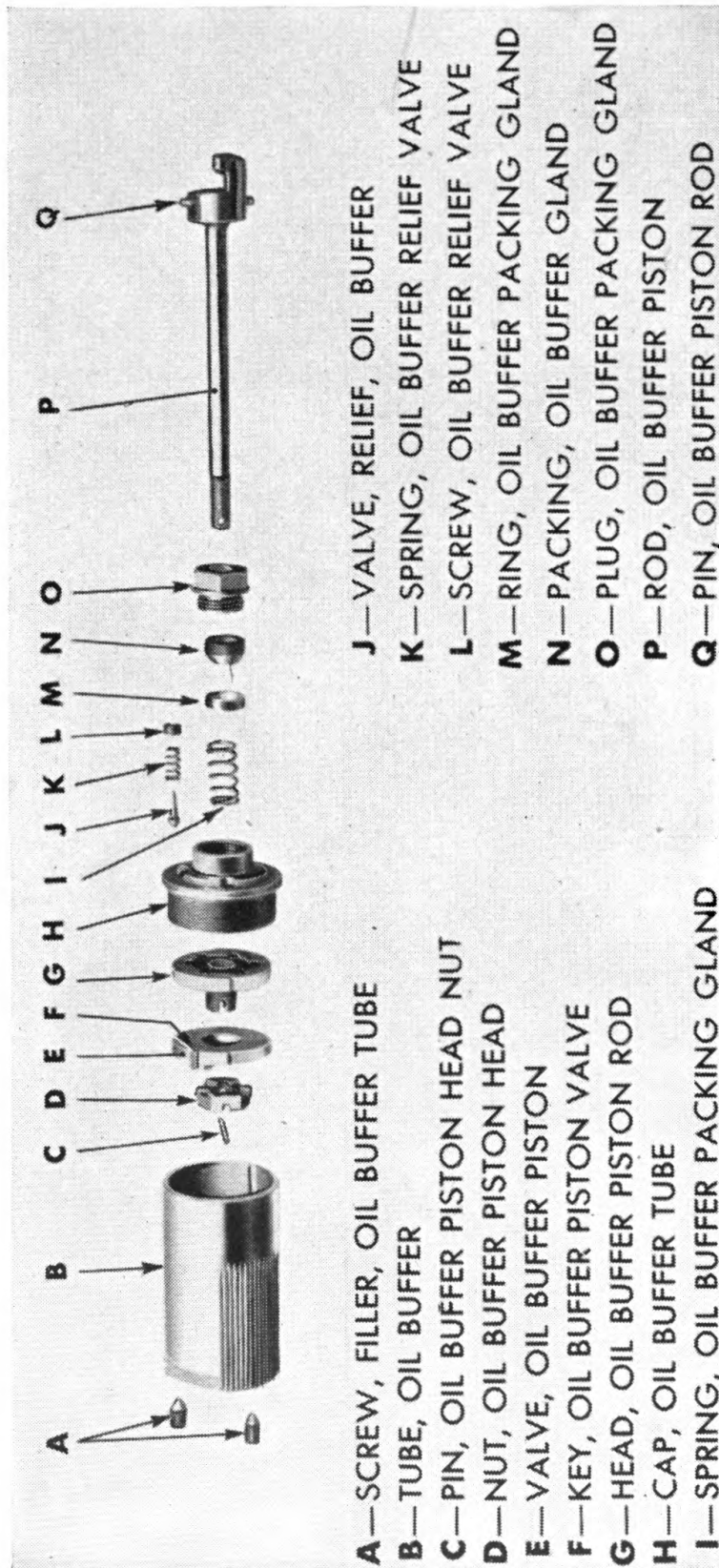


FIGURE 74.—Oil buffer assembly—exploded view.

[A. G. 300.7 (25 Sep 43).] (C 3, 15 Oct 43.)

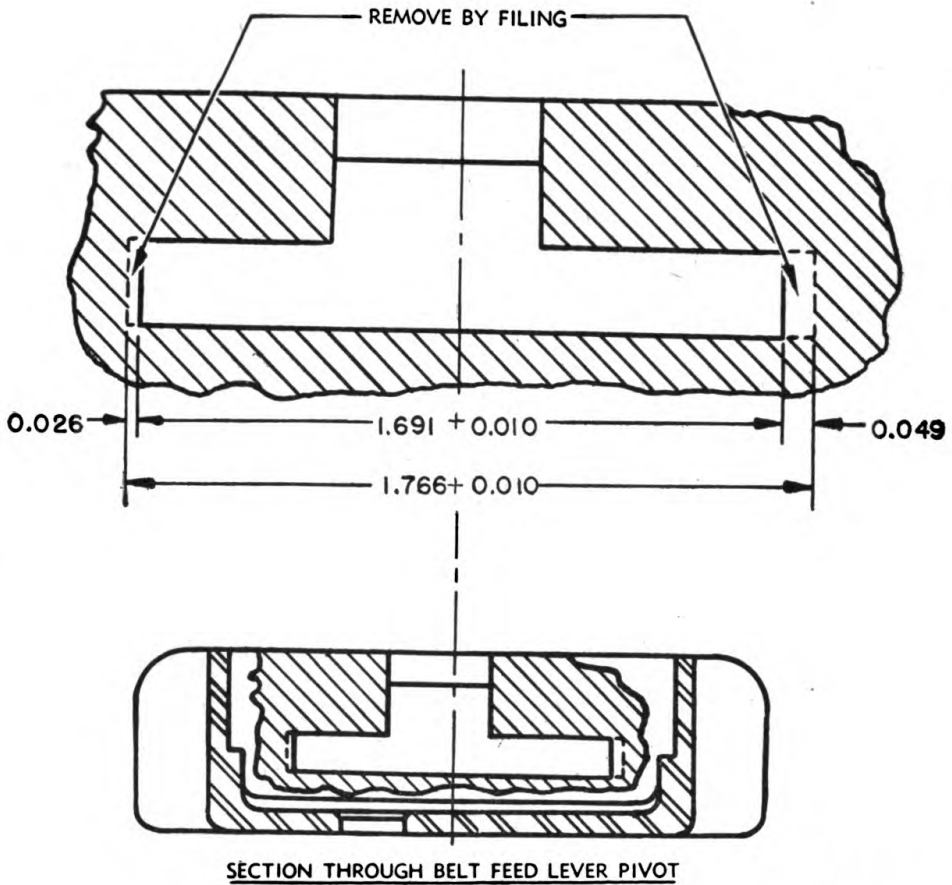
63. Miscellaneous.

* * * * *

f. Modification of belt feed lever slot in cover M2, all types.—Interference sometimes exists between the forward end of the belt feed lever and the sides of the slot in the cover through which the lever operates. This conditions results in excessive wear of the belt feed lever diamond and also limits the travel of the belt feed slide. The dimension of this slot in covers now being manufactured is 1.766 inches +0.010 inch. Up until a very recent date, this slot was 1.802 inches +0.010 inch, and prior to that it was 1.691 inches +0.010 inch. When covers with narrow slots (1.691 inches) are encountered and interference is noted by a slow rate of fire or binding action, the dimensions should be corrected by filing or machining the ends of the slots so that the length will agree with the present dimension (1.766 inches) as shown in figure 111. This requires removal of .026 inch from one side and .049 inch from the other. Metal should not be removed from the belt feed lever diamond in order to eliminate this interference. If, after performing * * * closing the cover.

* * * * *

[A. G. 300.7 (25 Sep 43).] (C 3, 15 Oct 43.)



RA PD 35669

FIGURE 111.—Modification of belt feed lever slot in cover—M2 gun—all types.

[A. G. 300.7 (25 Sep 43).] (C 3, 15 Oct 43.)

69. Decontamination of matériel.—Rescinded.

[A. G. 300.7 (25 Sep 43).] (C 3, 15 Oct 43.)

BY ORDER OF THE SECRETARY OF WAR:

G. C. MARSHALL,
Chief of Staff.

OFFICIAL:

J. A. ULIO,
Major General,
The Adjutant General.

ORDNANCE MAINTENANCE

BROWNING MACHINE GUN

CAL. .50, ALL TYPES

Prepared under the direction of the
 Chief of Ordnance

(with the cooperation of the Frigidaire Division of General Motors Corporation)

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* This manual supersedes TM 9-1225, June 12, 1942; TB 1225-1, January 1, 1942; TB 1225-2, January 1, 1942; TB 1225-3, February 23, 1942; TB 1225-4, March 19, 1942; TB 1225-5, March 25, 1942; TB 1225-6, May 6, 1942; TB 1225-8, June 12, 1942; TB 1225-9, June 17, 1942; TB 1225-10, September 15, 1942; TB 1225-11, June 27, 1942; TB 1225-12, September 14, 1942; TB 1225-13, December 8, 1942; TB 1225-14, December 2, 1942; TB 1225-16, April 8, 1943.

**ORDNANCE MAINTENANCE—BROWNING MACHINE GUN, CAL. .50,
ALL TYPES**

Section I

INTRODUCTION

	Paragraph
Purpose	1
Scope	2

1. PURPOSE.

a. This manual is published for the information and guidance of ordnance maintenance personnel.

2. SCOPE.

a. Contained herein are detailed and illustrated instructions regarding description, functional operation, inspection, disassembly, maintenance, repair, and assembly of the following Browning machine guns:

- (1) Cal. .50, M2, aircraft, basic.
- (2) Cal. .50, M2, aircraft, basic, with retracting slide.
- (3) Cal. .50, M2, aircraft, basic, with operating slide.
- (4) Cal. .50, M2, water-cooled, flexible.
- (5) Cal. .50, M2, heavy barreled, fixed.
- (6) Cal. .50, M2, heavy barreled, flexible.
- (7) Cal. .50, M1921, aircraft, fixed.
- (8) Cal. .50, M1921, aircraft, flexible.
- (9) Cal. .50, M1921A1, water-cooled.

b. These instructions are supplementary to information given in the field and technical manuals prepared for the using arms. The text consists of a single set of instructions which deals with all listed guns simultaneously, with exceptions for certain models being noted where necessary.

Section II

GENERAL DESCRIPTION

	Paragraph
General description of the guns	3
General data and characteristics	4

3. GENERAL DESCRIPTION OF THE GUNS.

a. The Browning Machine Gun, cal. .50, M2, aircraft, basic, is an air-cooled, recoil-operated, alternate feed gun which may be mounted on either a rigid, turret, or a hand-operated mount. It is adaptable for any type of installation in an aircraft by the addition of the proper parts and accessories. The gun may be fired by a mechanical or electrical accessory or by a manual trigger and trigger bar.

(1) The basic gun shown in figure 1 is equipped with a trigger bar, trigger bar pin assembly, bolt latch bracket, and a basic back plate with horizontal buffer assembly. It is installed in the wings, fuselage, or in the nose of the airplane. The Army Air Forces will supply the mechanism to retract the recoiling portion of the gun if required in turrets, and also will supply solenoids to fire the gun.

(2) In some installations, as in a turret of the airplane, the basic gun with retracting slide will be used, as shown in figure 2. In this case, the means of firing the gun may be by hand through the mechanism which is part of the adapter or by means of a solenoid attached to the receiver.

(3) The basic gun may be equipped with an operating slide group assembly, as shown in figure 3, for rigid installation forward of the pilot's cockpit with the breech end of the gun extending into the cockpit. The operating slide connects with the bolt by means of the bolt stud, and provides the means of retracting the breech mechanism by hand for loading and unloading the gun. The bolt also can be drawn back to its extreme rearward position and retained there by engaging the slot provided in the lower surface of the operating slide bar with the operating slide rear guide. If the gun is firing through the propeller, it must be fired by means of a synchronized mechanical trigger motor attached to the gun receiver, and this will be supplied by the Army Air Forces.

(4) Under unusual circumstances, the basic gun may be equipped with a retracting slide group assembly and a spade grip back plate assembly having a hand trigger. This is actually a flexible gun as listed in previous standard nomenclature lists. The retracting slide connects with the bolt by means of the bolt stud, and provides the means of retracting the recoiling parts by hand for loading and unloading the gun. The retracting slide grip remains stationary and in a forward position while the gun is

ORDNANCE MAINTENANCE—BROWNING MACHINE GUN, CAL. .50, ALL TYPES

firing. The gun thus equipped is installed in the fuselage of the airplane on a rigid mounting, and the gun is fired by operating the hand trigger.

(5) The preceding paragraphs describe specific applications for the basic gun; however, other installations of the basic gun are made by various combinations of these gun parts.

(6) The check lists appearing beneath figures 1 to 10, inclusive, designate assemblies and parts which should be assembled to, or supplied with, the gun in question, when issued. When such guns are received, care should be taken to see that such assemblies and parts are included.

b. The Browning Machine Gun, cal. .50, M2, water-cooled, flexible type, is a recoil-operated, water-cooled, alternate feed gun. The cooling system for the gun consists of a water jacket surrounding the barrel, and a water chest with pump for supplying and circulating water through the water jacket. This gun is used extensively against aircraft, and this method of cooling permits long bursts without overheating the barrel.

(1) The water-cooled, flexible, M2 Gun, shown in figure 4, is equipped with a retracting slide group assembly and a flexible back plate having a trigger and trigger safety, but the spade grips are omitted. The gun is installed in antiaircraft mounts and the spade grips are removed for needed clearance. A picture of this same gun with a spade grip back plate assembly for use in those mounts where this equipment is needed is shown in figure 5. The rear sights and rear sight bases have been removed from water-cooled flexible guns.

c. The Browning Machine Gun, cal. .50, M2, heavy barrel, fixed and flexible types, are air-cooled, recoil-operated, alternate feed guns. The main difference between this type of gun and other types of cal. .50, M2 Guns is the heavy barrel, the barrel support, and the oil buffer assembly. The barrel of this type of gun must be unscrewed and removed through the front of the gun before the oil buffer group and barrel extension can be removed from the gun. The heavy barrel does not recoil with as much force as the lighter barrels; therefore, it has been the practice in the past to omit the oil buffer piston valve assembly. This allowed the oil to pass more freely through the openings in the oil buffer piston rod head and offered less resistance to the recoil of the barrel. Present manufacture is omitting the oil buffer gland packing, packing gland ring, packing gland spring, relief valve, relief valve spring, relief valve screw, tube filler screws, and oil in addition to the oil buffer piston valve assembly. These heavy barrel guns are installed in mounts of several different types, in combat vehicles and tanks, or are used as ground guns mounted on the Machine Gun Tripod Mount, cal. .50, M3.

(1) The heavy barrel, fixed, M2 Gun, shown in figure 6, is equipped with a side plate trigger, basic back plate, with horizontal buffer assembly

GENERAL DESCRIPTION

(vertical buffer assembly may be used), and retracting slide group assembly for fixed installations in tanks.

(2) The heavy barrel, flexible, M2 Gun, as shown in figure 7, is equipped with a spade grip back plate assembly and retracting slide group assembly for flexible mounting in combat vehicles and tanks, or on the M3 Tripod Mount.

d. The Browning Machine Gun, cal. .50, M1921, aircraft, fixed and flexible types, are recoil-operated, air-cooled, single feed guns which feed from the left-hand side only.

(1) The aircraft, fixed, M1921 Gun, shown in figure 8, is equipped with a back plate with vertical buffer assembly (horizontal buffer assembly may be used), and an operating slide group assembly. The gun was originally designed solely for use as a fixed, synchronized gun.

(2) The aircraft, flexible, M1921 Gun, shown in figure 9, is equipped with a spade grip back plate assembly and a retracting slide group assembly. This gun was installed on a flexible mount in the aircraft.

e. The Browning Machine Guns, cal. .50, M1921 and M1921A1, water-cooled, are recoil-operated, water-cooled, single feed guns which feed from the left-hand side only. The M1921 Gun was originally designed for use with Antiaircraft Machine Gun Tripod Mount, cal. .50, M1. A large number of these guns are still in use in the Navy; however, all such weapons in the hands of the Army have been modified to the M1921A1 type.

(1) The water-cooled M1921A1 type gun, shown in figure 10, is equipped with a spade grip back plate assembly and a retracting slide group assembly. It will be noted that the retracting slide is mounted at the top center of the side plate rather than lower rear corner as on other guns. This gun is used in the Antiaircraft Tripod Mount, cal. .50, M1.

4. GENERAL DATA AND CHARACTERISTICS.

a. All types of Browning Machine Guns, cal. .50, M2 are alterable as follows:

(1) Ammunition can be fed from left or right side by repositioning of the parts in the belt feed group, the feedway, and the bolt.

(2) Operating and retracting slides can be changed from right to left side of receiver by repositioning and changing the necessary parts. The cover latch lever may be changed from right to left side of receiver by changing the necessary parts.

(3) All barrels for the cal. .50 guns have 8 lands, and the rifling has a right-hand twist which makes one turn in 15 inches. The aircraft, basic type gun is equipped with a 36-inch barrel which weighs 10 pounds. The water-cooled gun is equipped with a 45-inch barrel which weighs 15.2 pounds. The heavy barrel gun is equipped with a 45-inch barrel which

ORDNANCE MAINTENANCE—BROWNING MACHINE GUN, CAL. .50,
ALL TYPES

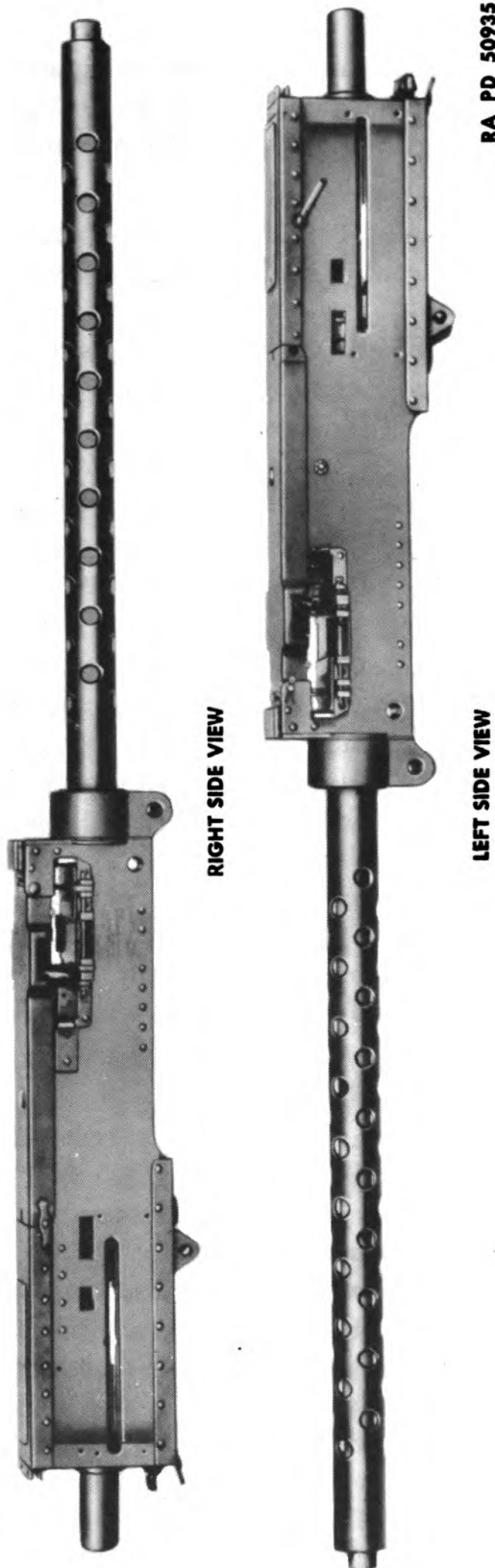
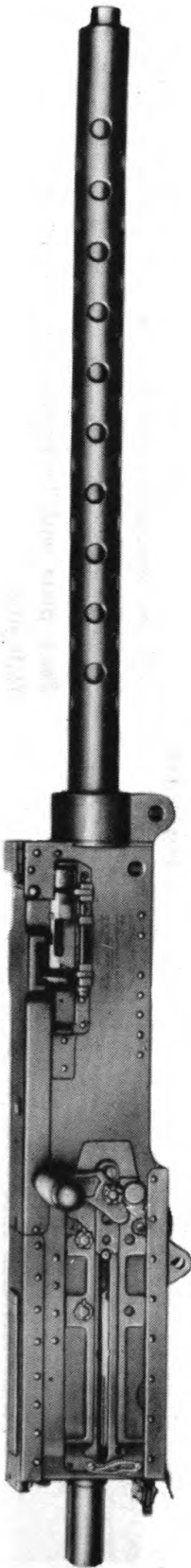


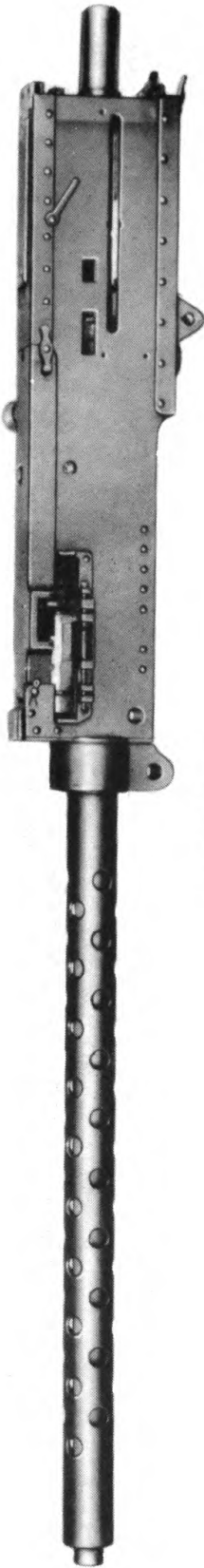
Figure 1—Browning Machine Gun, Cal. .50, M2, Aircraft, Basic

SPECIFICATIONS					
Weight of gun	—	61 lb	Weight of barrel	—	10 lb
Length of gun	—	56¼ in.	Length of barrel	—	36 in.
CHECK LIST					
Trigger bar			Link stripper		
Trigger bar pin assembly			Bolt latch bracket		
Front cartridge stop			Back plate with horizontal buffer assembly		
Rear cartridge stop			Bolt stud		
R.H. rear cartridge stop assembly			Bolt handle assembly		

GENERAL DESCRIPTION



RIGHT SIDE VIEW



LEFT SIDE VIEW

RA PD 50937

**Figure 2—Browning Machine Gun, Cal. .50, M2, Aircraft, Basic,
With Retracting Slide Group Assembly**

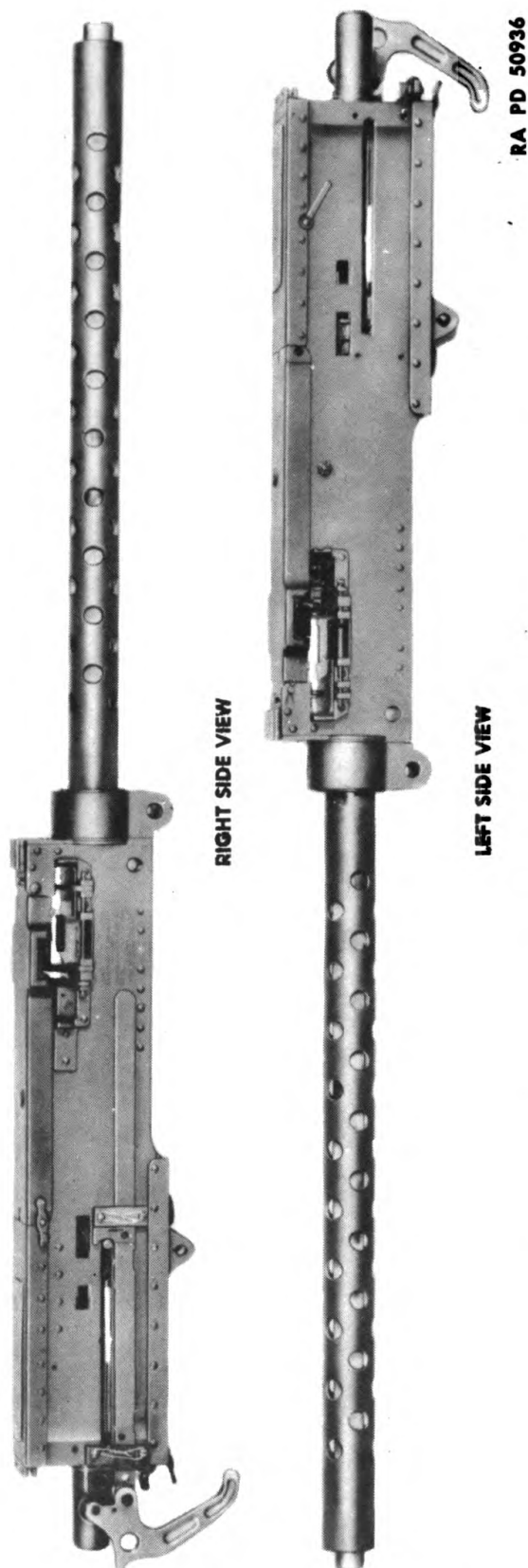
SPECIFICATIONS

Weight of gun	—	64 lb	Weight of barrel	—	10 lb
Length of gun	—	56¼ in.	Length of barrel	—	36 in.

CHECK LIST

- | | |
|---------------------------------|--|
| Retracting slide group assembly | R.H. rear cartridge stop assembly |
| Trigger bar | Link stripper |
| Trigger bar pin assembly | Bolt latch bracket |
| Front cartridge stop | Back plate with horizontal buffer assembly |
| Rear cartridge stop | Bolt stud |

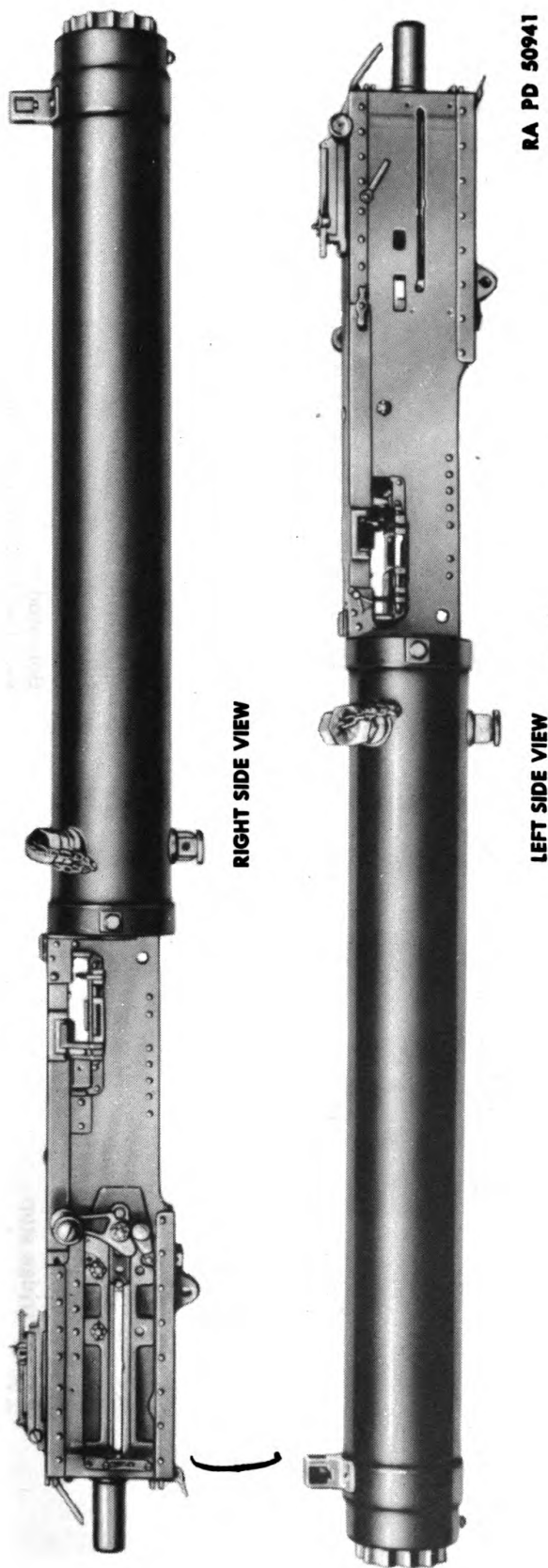
ORDNANCE MAINTENANCE—BROWNING MACHINE GUN, CAL. .50,
ALL TYPES



**Figure 3—Browning Machine Gun, Cal. .50, M2, Aircraft, Basic,
With Operating Slide Group Assembly**

SPECIFICATIONS		
Weight of gun	—	62½ lb
Length of gun	—	57 in.
Operating slide assembly		
Trigger bar		
Trigger bar pin assembly		
Front cartridge stop		
Rear cartridge stop		
CHECK LIST		
	Weight of barrel	— 10 lb
	Length of barrel	— 36 in.
	R.H. rear cartridge stop assembly	
	Link stripper	
	Bolt latch bracket	
	Back plate with horizontal buffer assembly	
	Bolt stud	

GENERAL DESCRIPTION



RA PD 50941

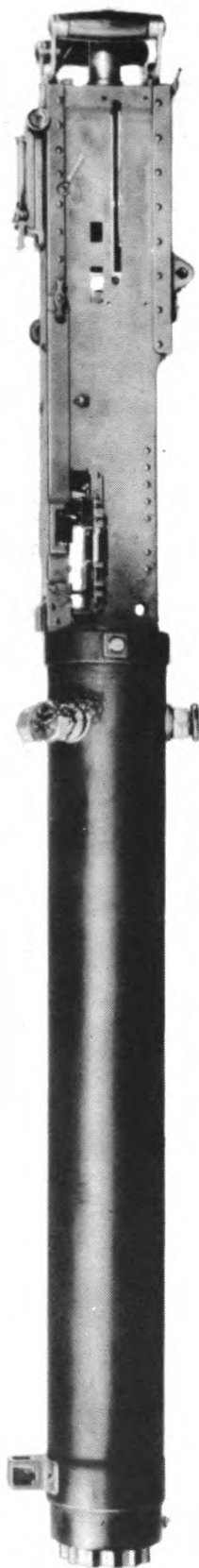
Figure 4—Browning Machine Gun, Cal. .50, M2, Water-Cooled, Flexible (For Use In Antiaircraft Mounts)

SPECIFICATIONS			
Weight of gun	—	Weight of barrel	—
Length of gun	100½ lb	Length of barrel	15.2 lb
	66 in.		45 in.
CHECK LIST			
Back plate assembly with trigger and trigger safety		Link stripper	
Trigger bar		Retracting slide assembly	
Trigger bar pin assembly		Front sight assembly	
Front cartridge stop		Combination rear sight assembly	
Rear cartridge stop		Bolt stud	
R.H. rear cartridge stop assembly		Front end cap thread cover	

ORDNANCE MAINTENANCE—BROWNING MACHINE GUN, CAL. .50,
ALL TYPES



RIGHT SIDE VIEW



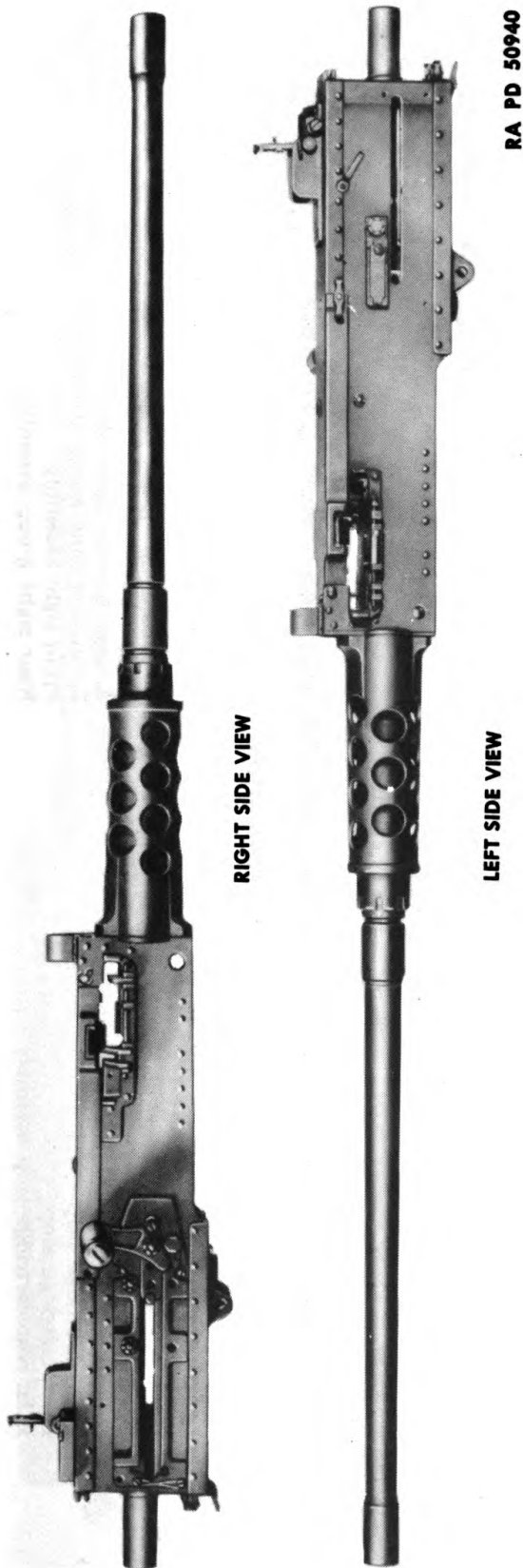
LEFT SIDE VIEW

RA PD 50939

Figure 5—Browning Machine Gun, Cal. .50, M2, Water-Cooled, Flexible

SPECIFICATIONS		CHECK LIST	
Weight of gun	—	100½ lb	
Length of gun	—	66 in.	
		Spade grip back plate assembly	
		Trigger bar	
		Trigger bar pin assembly	
		Front cartridge stop	
		Rear cartridge stop	
		R.H. rear cartridge stop assembly	
Weight of barrel	—	15.2 lb	
Length of barrel	—	45 in.	
		Link stripper	
		Retracting slide assembly	
		Front sight assembly	
		Combination rear sight assembly	
		Bolt stud	
		Front end cap thread cover	

GENERAL DESCRIPTION



RA PD 50940

Figure 6—Browning Machine Gun, Cal. .50, M2, Heavy Barrel, Fixed

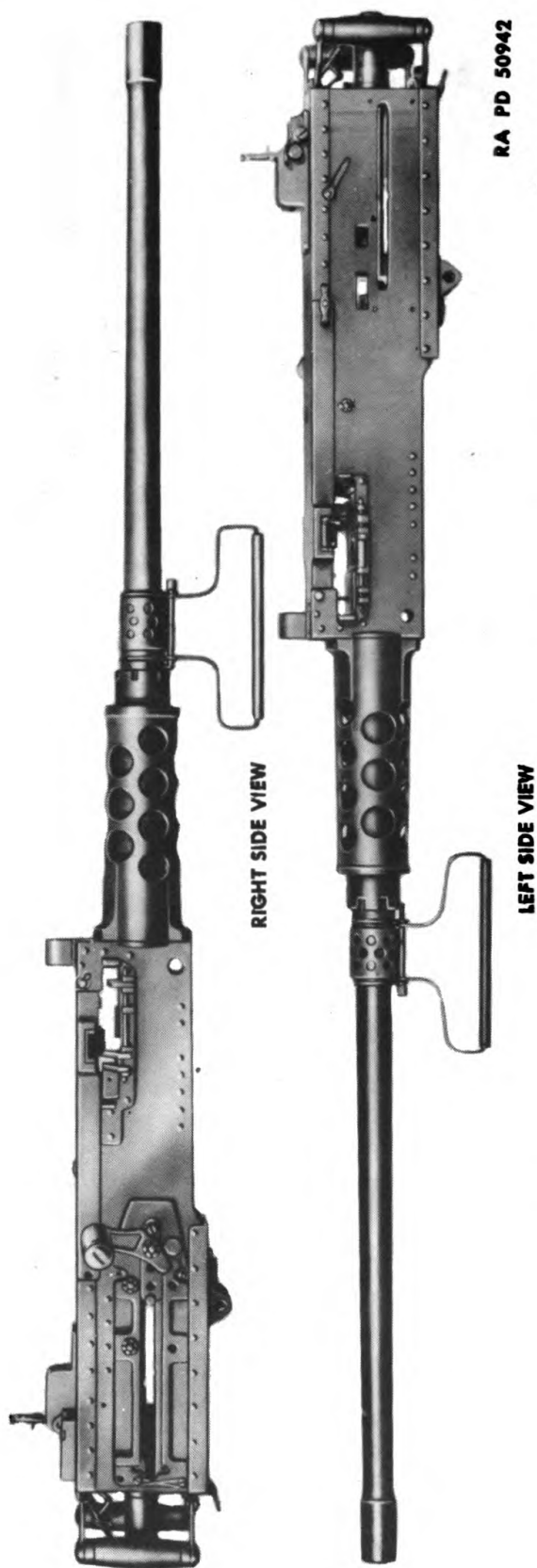
SPECIFICATIONS

Weight of gun	—	82 lb
Length of gun	—	65 1/8 in.
Weight of barrel	—	28 lb
Length of barrel	—	45 in.

CHECK LIST

- Basic back plate with horizontal (or vertical) buffer assembly
- Side plate trigger
- Front cartridge stop
- Rear cartridge stop
- R.H. rear cartridge stop assembly
- Link stripper
- Bolt latch bracket
- Retracting slide group assembly
- Front sight assembly
- Rear sight group assembly
- Bolt stud

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ALL TYPES



RA PD 50942

Figure 7—Browning Machine Gun, Cal. .50, M2, Heavy Barrel, Flexible

SPECIFICATIONS

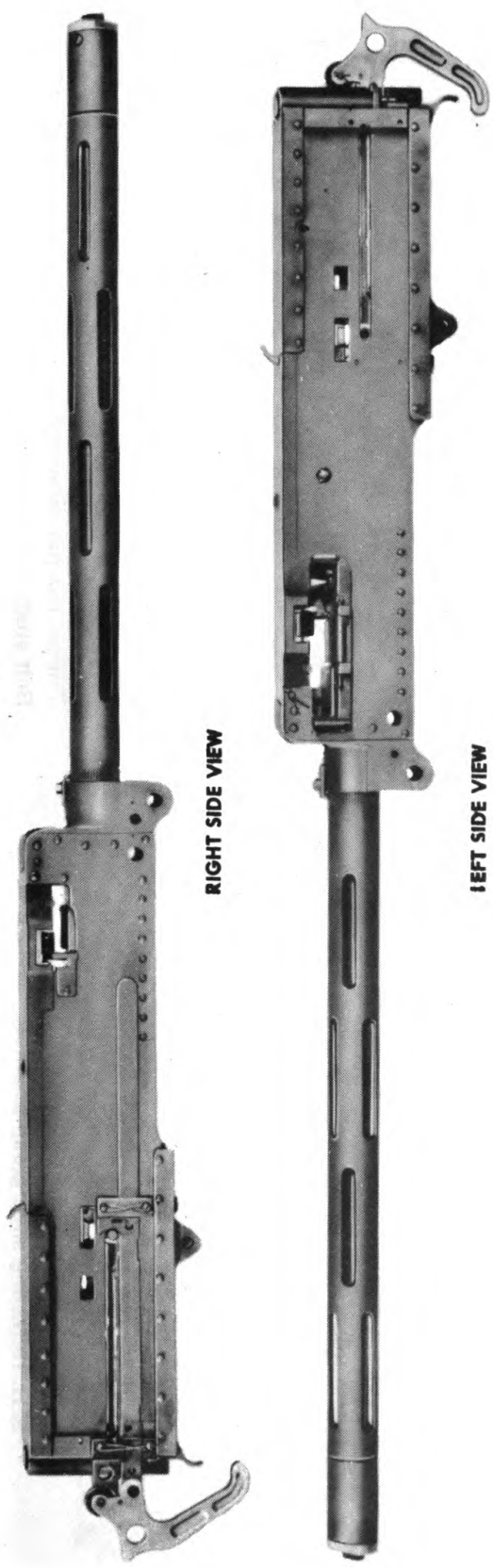
Weight of gun	—	84 lb	Weight of barrel	—	28 lb
Length of gun	—	65½ in.	Length of barrel	—	45 in.

CHECK LIST

Spade grip back plate (with bolt latch release and buffer tube sleeve assembly)
Front cartridge stop
Rear cartridge stop
R.H. rear cartridge stop assembly
Link stripper
Bolt latch and related parts

Trigger bar
Trigger bar pin assembly
Retracting slide group assembly
Front sight assembly
Rear sight group assembly
Barrel carrier assembly
Bolt stud

GENERAL DESCRIPTION

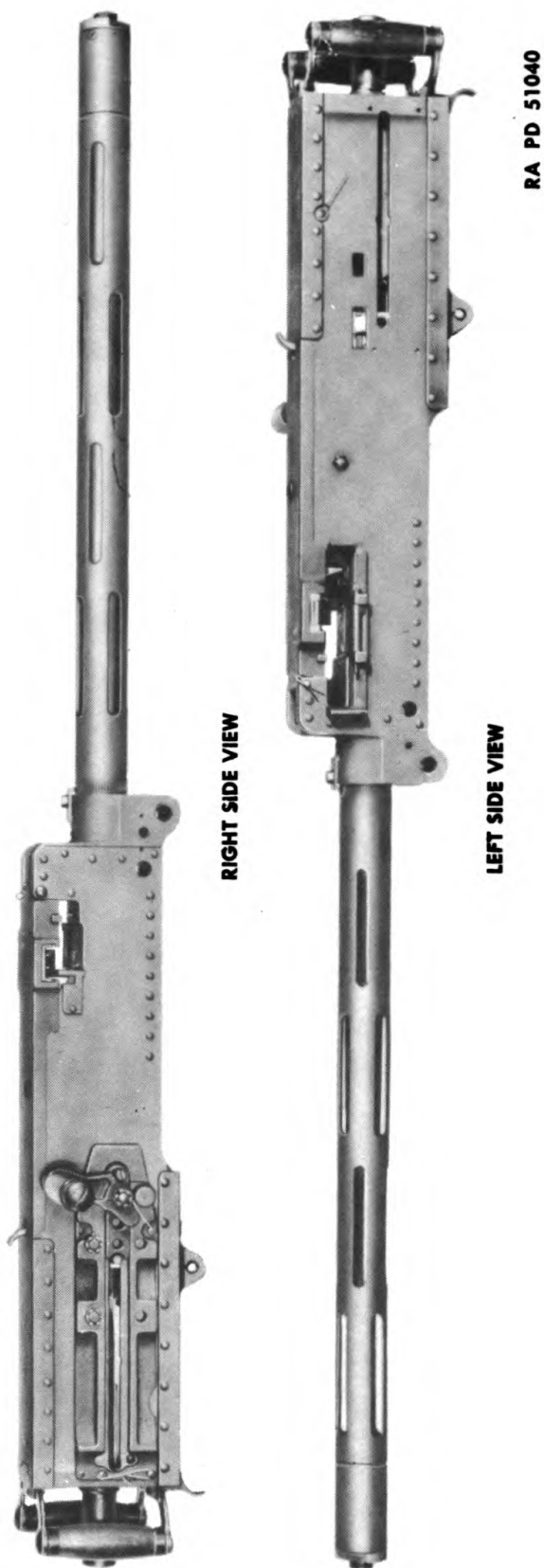


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Figure 8—Browning Machine Gun, Cal. .50, M1921, Aircraft, Fixed

SPECIFICATIONS					
Weight of gun	—	55 lb	Weight of barrel	—	10½ lb
Length of gun	—	56¾ in.	Length of barrel	—	36 in.
CHECK LIST					
Vertical buffer back plate assembly			Bolt stud		
Operating slide assembly					

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ALL TYPES



RA PD 51040

Figure 9—Browning Machine Gun, Cal. .50, M1921, Aircraft, Flexible

SPECIFICATIONS			
Weight of gun	—	Weight of barrel	10½ lb
Length of gun	56 in.	Length of barrel	36 in.
CHECK LIST			
Spade grip back plate assembly		Trigger bar pin assembly	
R.H. retracting slide group assembly		Bolt stud	
Trigger bar			

GENERAL DESCRIPTION

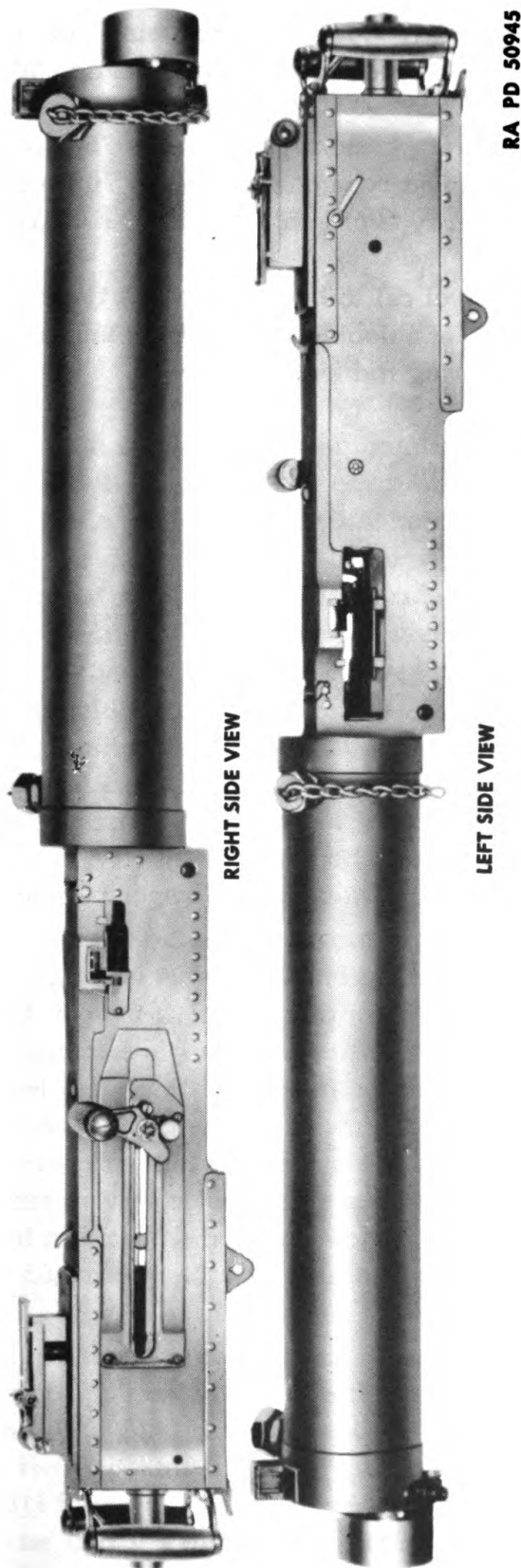


Figure 10—Browning Machine Gun, Cal. .50, M1921A1, Water-Cooled

SPECIFICATIONS

Weight of gun	—	79 lb	Weight of barrel	—	10½ lb
Length of gun	—	56 in.	Length of barrel	—	36 in.

CHECK LIST

Spade grip back plate assembly	Combination rear sight assembly
R.H. retracting slide group assembly	Front sight assembly
Trigger bar	Bolt stud
Trigger bar pin assembly	

**ORDNANCE MAINTENANCE—BROWNING MACHINE GUN, CAL. .50,
ALL TYPES**

weighs 28 pounds. A small number of water-cooled guns now in service are equipped with 36-inch barrels; however, they are being equipped with 45-inch barrels in accordance with Field Service Modification Work Order No. A37-W12.

(4) The rate of fire for the aircraft, basic type of gun is 750 to 850 rounds per minute; for the water-cooled type of gun, 550 to 700 rounds per minute; and for the heavy barrel type of gun, 400 to 500 rounds per minute.

(5) The driving spring assembly of cal. .50, M2 Guns (all types) has been modified, and is now composed of a double spring (inner and outer), assembled with modified driving spring rod assembly.

Section III

FUNCTIONAL OPERATION

	Paragraph
General functional operation	5
Detailed functioning	6
Single-shot, semiautomatic operation	7

5. GENERAL FUNCTIONAL OPERATION.

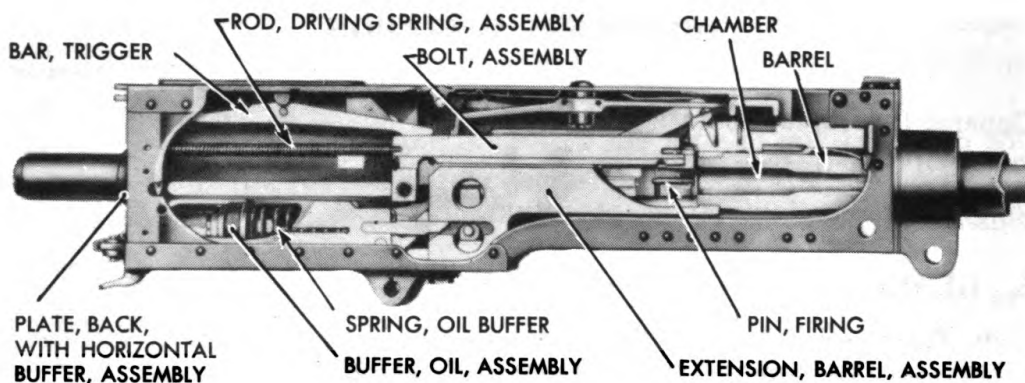
a. Although the Browning machine gun is an automatic weapon, it is necessary to load and cock it manually to start the operating sequence. The following description assumes that this has been done.

b. The mechanical or automatic operation is started by releasing the firing mechanism which fires or explodes a cartridge. This is released by means of a manual trigger, solenoid, trigger motor, or other means. When any cartridge is fired, the burning powder violently generates gas. Since the gas is confined by the cartridge case and bullet, it exerts a tremendous pressure. This pressure, which exceeds 50,000 pounds per square inch, pushes against the rear face of the bullet which up to this moment is still held in the cartridge case. Considering the actual area of the back of the bullet, a driving force of about 5 tons pushes the bullet out of the cartridge case and out of the barrel. This same force tries to drive the empty cartridge case out of the chamber toward the rear. Such action is prevented by having the bolt assembly positively locked against the rear of the cartridge at the instant of firing (fig. 11).

c. As the bullet travels out of the barrel, the force of recoil carries the barrel, barrel extension, and bolt (known as the recoiling portion) backward about $1\frac{1}{8}$ inches. During this movement, the bolt is unlocked from the barrel and barrel extension. The rearward travel of the barrel and barrel extension is stopped by the oil buffer assembly, and held by the accelerator acting upon the barrel extension shank. The bolt assembly continues its rearward travel for an additional 6 inches until it is stopped by the driving spring rod assembly and the back plate. During this rearward motion the bolt assembly withdraws the empty cartridge case from the chamber, and also extracts a second live cartridge from the supply belt.

d. The bolt assembly is driven forward by the driving spring, and during this forward motion the empty cartridge is ejected from the bottom of the gun. At the same time, the second live cartridge is started into the barrel chamber. The oil buffer spring shoves the barrel extension and barrel forward. During this movement, the bolt assembly is again locked to the barrel extension and barrel, so as to prevent the cartridge case from being driven rearward after firing. If trigger action has been main-

ORDNANCE MAINTENANCE—BROWNING MACHINE GUN, CAL. .50, ALL TYPES



RA PD 50946

Figure 11—Cutaway View Of Gun

tained, the firing pin is released just before the recoiling portion reaches its foremost position. This fires the second cartridge and another cycle is started. This cycle is repeated automatically as long as trigger action is maintained and as long as ammunition is supplied.

6. DETAILED FUNCTIONING.

a. In the following exposition, a gun employing a manual trigger is used. Except for the actual manner in which the sear is depressed, whether by a manual trigger and trigger bar, or by a solenoid or trigger motor in combination with the sear slide, the functional operation of all guns is identical.

b. Each time a cartridge is fired, the mechanical action within the gun involves many parts moving simultaneously or in their proper order. The action of these parts and their relationship to each other can be explained more clearly if the action is separated into various phases. These phases will be explained in the following order:

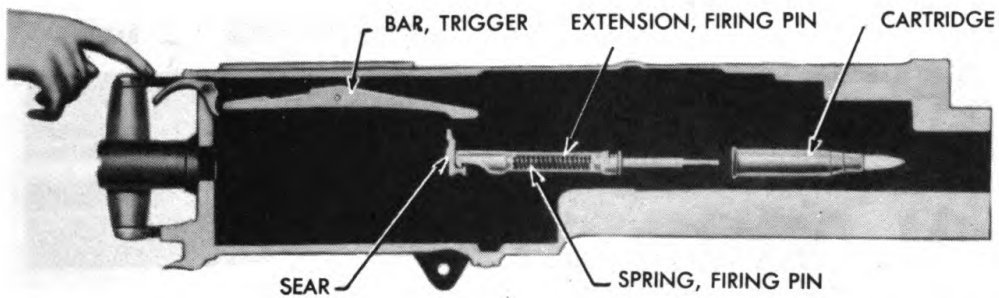
- (1) Firing.
- (2) Recoiling.
- (3) Counterrecoiling.
- (4) Cocking.
- (5) Automatic firing.
- (6) Feeding.
- (7) Extracting and ejecting.

(a) Firing.

1. When the gun has been loaded and the firing pin spring has been cocked or compressed by hand, the firing mechanism is in the position shown in figure 12.

2. When the trigger is pressed, it raises the back end of the trigger bar. The trigger bar pivots on the trigger bar pin, causing the front end to

FUNCTIONAL OPERATION



RA PD 50947

Figure 12—Ready To Fire Position

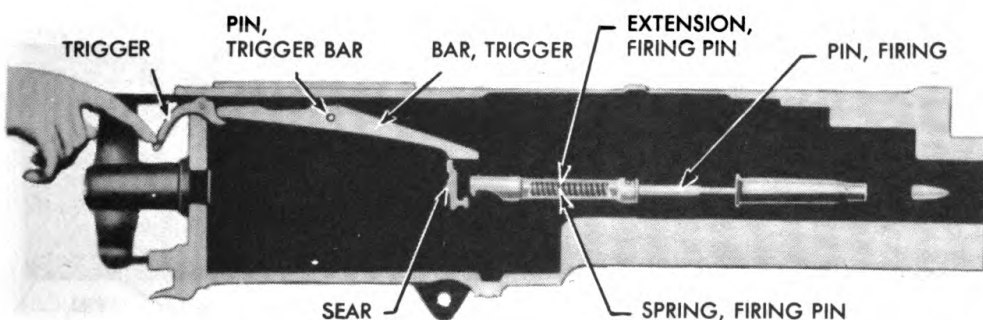
press down on the top of the sear. The sear is forced down until the notch in the sear is disengaged from the shoulder of the firing pin extension. The firing pin and firing pin extension are driven forward by the firing pin spring to fire the cartridge (fig. 13).

(b) Recoiling.

1. The complete cycle of the recoiling portion of the gun, which takes place as each cartridge is fired, consists of the recoil stroke when certain parts of the gun move rearward, and the counterrecoil stroke when these same parts move forward. At the instant of firing, the barrel, barrel extension, and bolt, known as the recoiling portion, are in the forward position in the gun, as shown in figure 14.

2. At this time, the bolt is held securely against the base of the cartridge by the breech lock, which extends up from the barrel extension into a notch in the underside of the bolt (fig. 15-A).

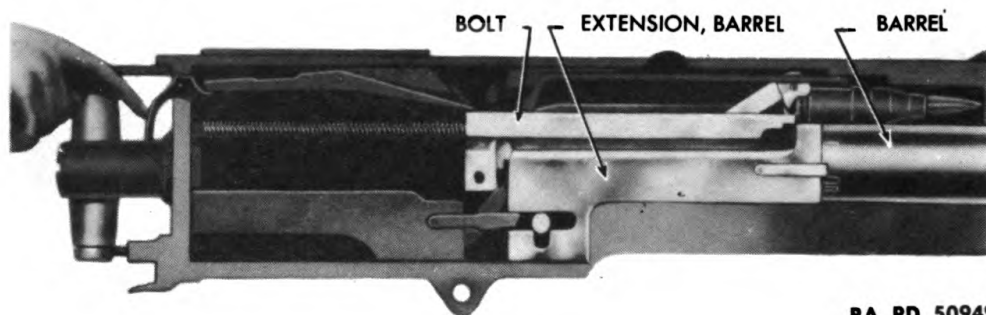
3. After the cartridge explodes, and as the bullet travels out of the barrel, the force of recoil drives the recoiling portion rearward. During the first three-quarter inch of travel, the breech lock is pushed back off the breech lock cam step. This permits the breech lock to be forced down



RA PD 50948

Figure 13—Firing Position

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RA PD 50949

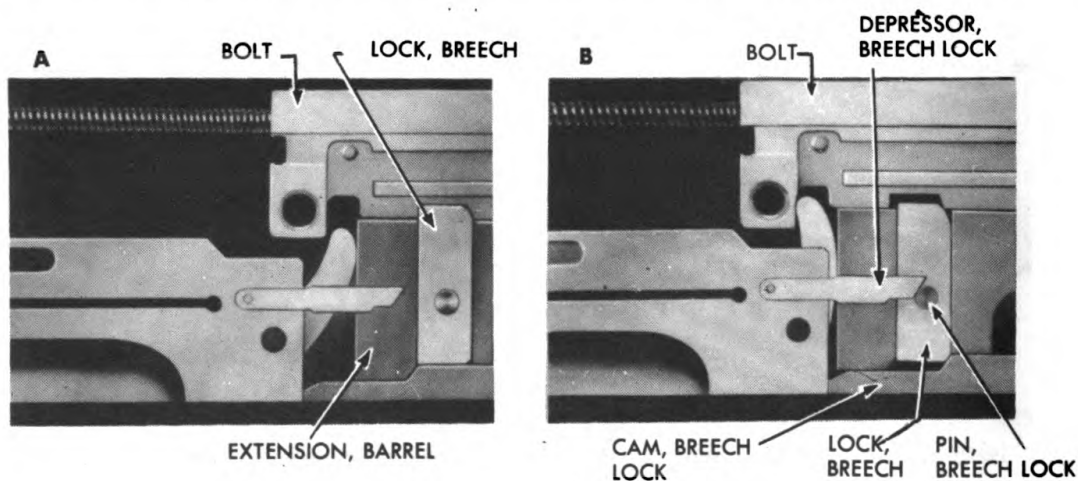
Figure 14—Recoiling Portion In Forward Position

out of the notch in the bolt by the breech lock depressors engaging the breech lockpin, and by the bolt's action on the doubled beveled forward face of the breech lock. This unlocks the bolt. Figure 15-B shows the unlocking action taking place.

4. As the recoiling portion moves toward the rear, the barrel extension rolls the accelerator rearward. The tip of the accelerator strikes the lower projection on the bolt and hastens or accelerates the bolt to the rear. In figure 16, the breech lock is completely unlocked from the bolt.

5. The barrel and barrel extension have a total rearward travel of $1\frac{1}{8}$ inches, at which time they are completely stopped by the oil buffer body assembly (fig. 17).

6. During this recoil of $1\frac{1}{8}$ inches, the oil buffer spring is compressed in the oil buffer body by the barrel extension shank. The spring is locked in the compressed position by the claws of the accelerator, which are



RA PD 50950

Figure 15—Breech Lock Locked "A" And Unlocking "B"

FUNCTIONAL OPERATION

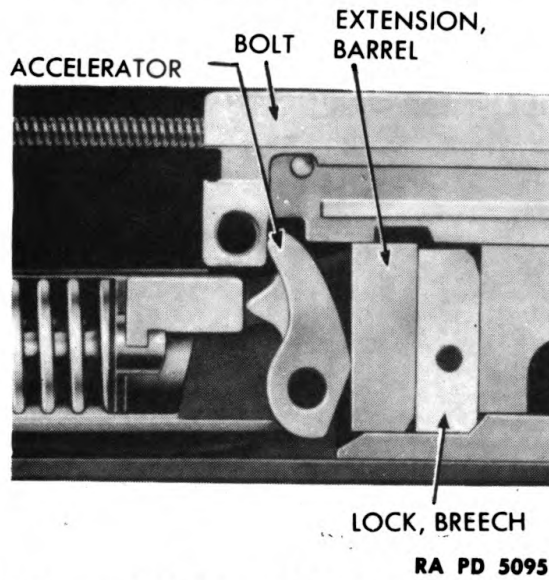


Figure 16—Breech Lock Unlocked

moved against the shoulders of the barrel extension shank (fig. 18).

7. The oil buffer assists the oil buffer spring in bringing the barrel and barrel extension to rest during the recoil stroke. During the $1\frac{1}{8}$ inches of rearward travel, the piston rod head is forced from the forward end of the oil buffer tube to the rear. The oil at the rear of the oil buffer tube, under pressure of the piston, escapes to the front side of the piston. Its only path is through restricted notches between the edge of the piston rod head and valve, and the oil buffer tube (fig. 19).

8. The bolt travels rearward for a total of $7\frac{1}{8}$ inches. During this travel, the driving spring assembly is compressed. The rearward stroke of the bolt is finally stopped as the bolt strikes the buffer plate. Thus, part of the recoil energy of the bolt is stored in the driving spring assembly, and the remainder is absorbed by the buffer disks in the back plate. At the end of the recoil movement, the parts are in the position shown in figure 20.

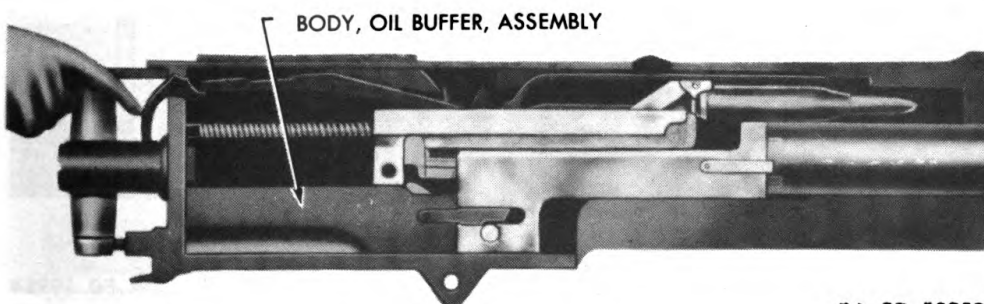
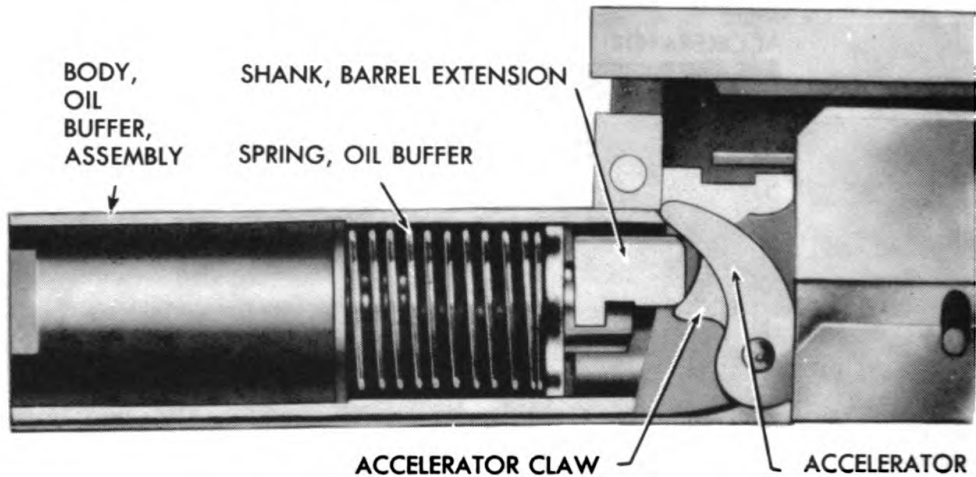


Figure 17—Recoiling Of Barrel And Barrel Extension

ORDNANCE MAINTENANCE—BROWNING MACHINE GUN, CAL. .50, ALL TYPES



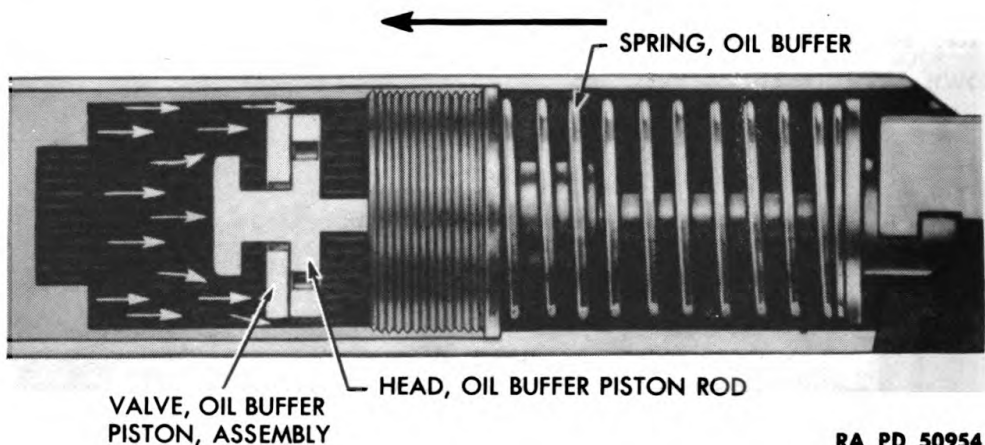
RA PD 50953

Figure 18—Oil Buffer Spring Compressed And Locked

(c) Counterrecoiling.

1. After completion of the recoil stroke, the bolt is forced forward by the energy stored in the driving spring, and the compressed buffer disks. When the bolt has moved forward about 5 inches, the tip of the accelerator is struck by a projection on the bottom of the bolt. This rolls the accelerator forward (fig. 21).

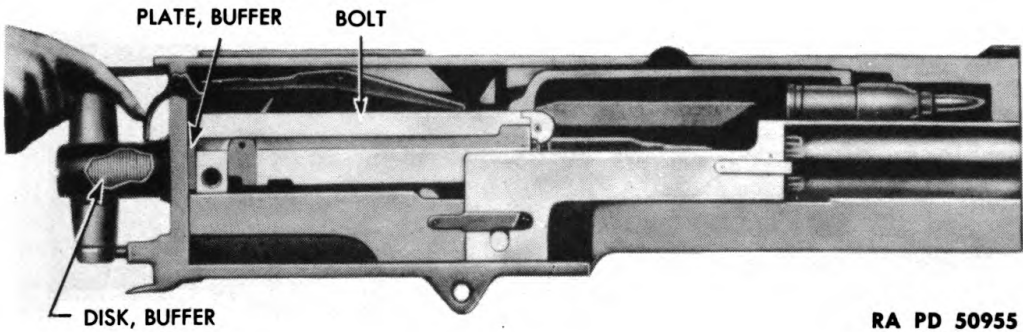
2. As the accelerator rolls forward, the accelerator claws are moved away from the shoulders of the barrel extension shank. This releases the oil buffer spring. The accelerator rolling forward and the energy stored in the spring shove the barrel extension and barrel forward (fig. 22).



RA PD 50954

Figure 19—Action Of Oil Buffer Assembly During Recoil

FUNCTIONAL OPERATION

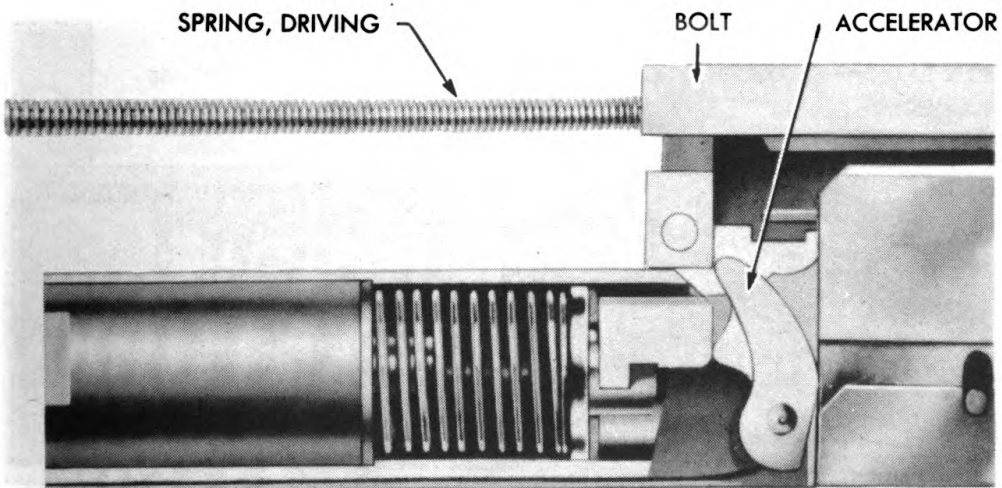


RA PD 50955

Figure 20—Recoil Completed

3. No restriction to motion is desired on the forward or counterrecoil stroke of the barrel and barrel extension; therefore, on the forward stroke, additional openings for oil flow are provided in the piston rod head of the oil buffer assembly. The piston valve is forced away from the piston rod head as the parts move forward, uncovering these additional openings. This provides an additional path and permits oil to escape freely at the opening in the center of the piston valve as well as at the edge of the piston valve next to the tube wall (fig. 23).

4. As the barrel extension moves forward, the breech lock engages the breech lock cam and is forced upward. The bolt, which has been continuing its forward motion since striking the accelerator, has at this instant reached a position where the notch on the underside is directly above the breech lock, thus permitting the breech lock to engage the bolt. The bolt



RA PD 50956

Figure 21—Bolt Striking Accelerator To Release Buffer Spring

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ALL TYPES

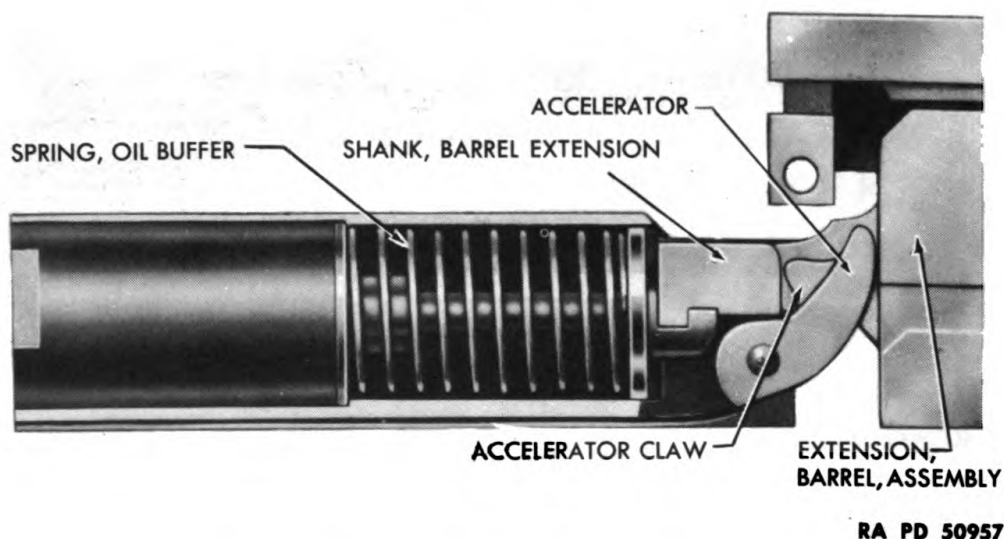


Figure 22—Oil Buffer Spring Released

is thereby locked to the barrel extension and barrel just before the recoil-
ing portion reaches the firing position (fig. 24).

(d) Cocking.

The act of cocking the gun is begun as the bolt starts to recoil im-
mediately after firing. As the bolt moves rearward, the tip of the cocking
lever, which is in the V-slot in the top plate bracket, is forced forward.
At the time of firing, the parts are positioned as shown in figure 25.

2. The cocking lever is pivoted so that the lower end forces the firing
pin extension rearward. The firing pin spring is thus compressed against

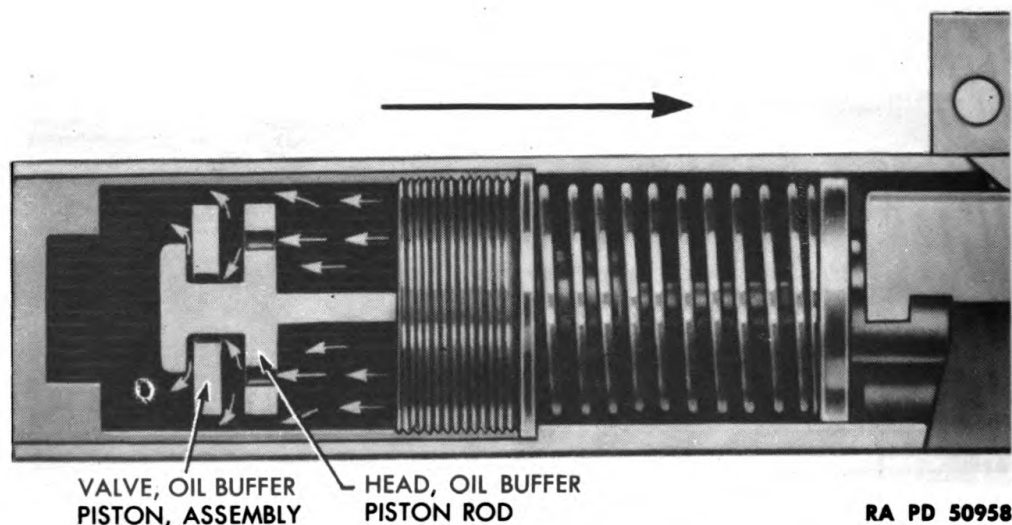
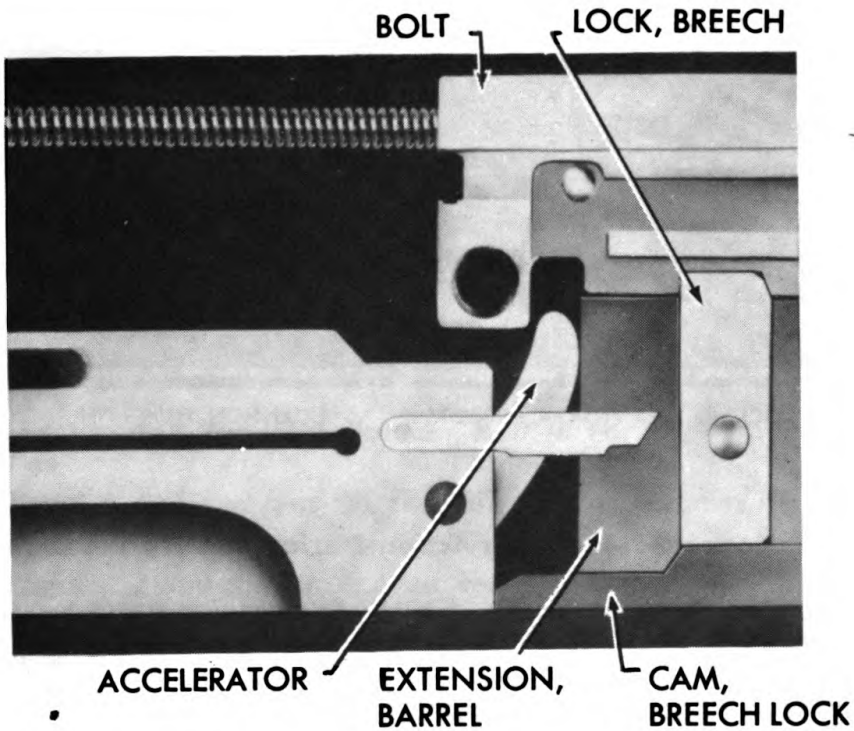


Figure 23—Action Of Oil Buffer Assembly During Counterrecoil

FUNCTIONAL OPERATION

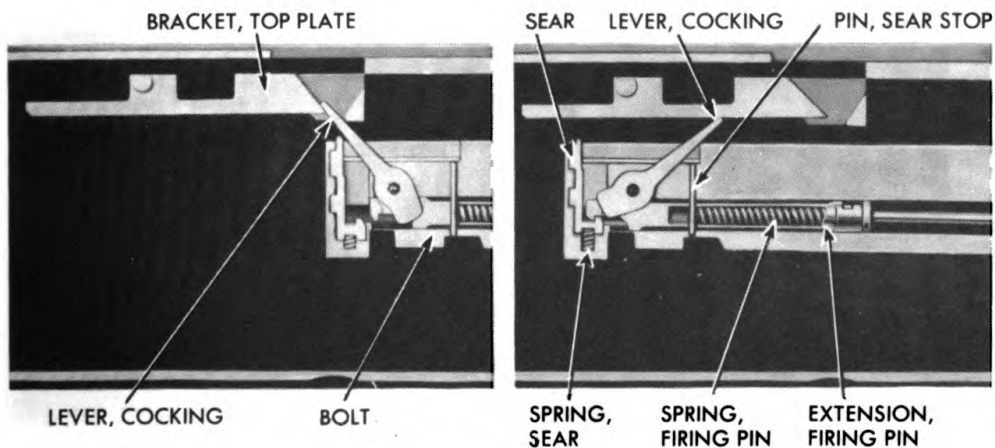


RA PD 50959

Figure 24—Breech Lock Engaged

the sear stop pin. The firing pin extension moves rearward until the shoulder at its back hooks over the notch at the bottom of the sear under pressure of the sear spring (fig. 25).

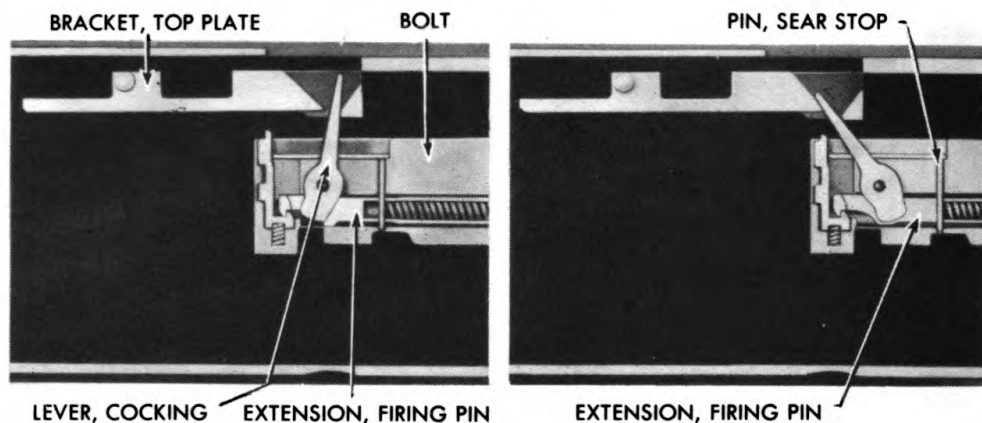
3. During the forward motion of the bolt, the tip of the cocking lever enters the V-slot of the top plate bracket. This action swings the bottom



RA PD 50960

Figure 25—Cocking Action During Recoil

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ALL TYPES**

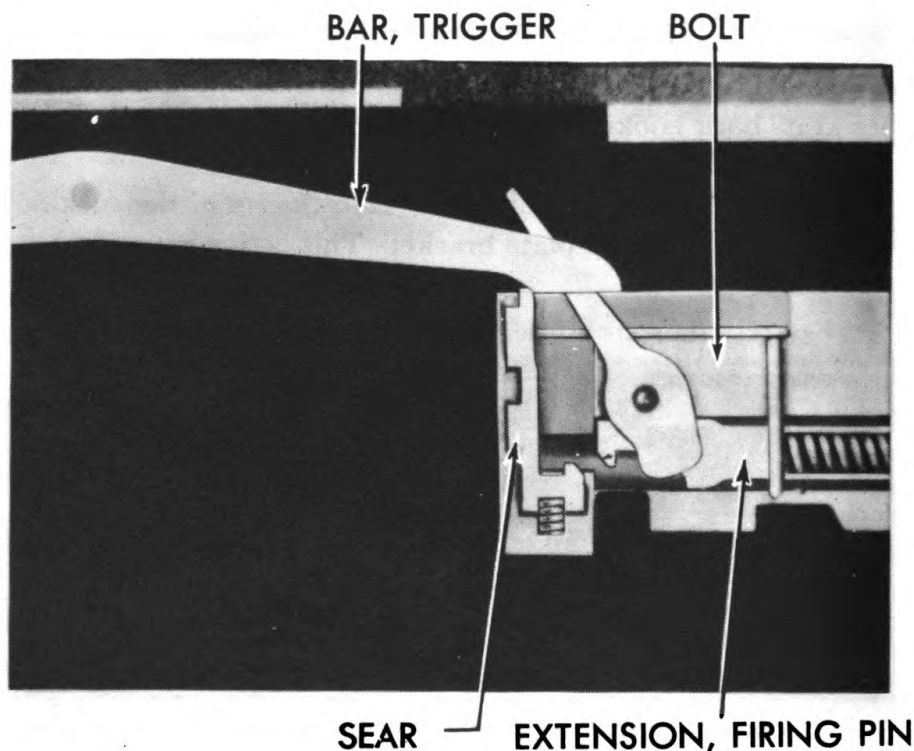


RA PD 50961

Figure 26—Cocking Action During Counterrecoil

of the cocking lever out of the path of the firing pin extension, thus permitting the firing pin to snap forward when released by the sear. Figure 26 shows the cocking lever being rotated as the bolt moves forward.

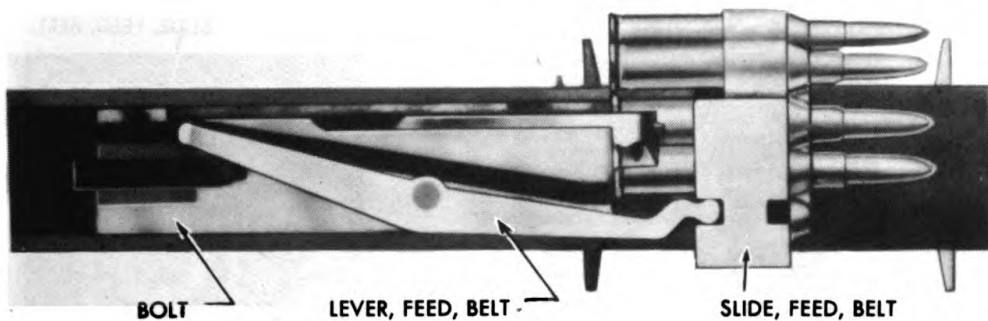
4. When the recoiling portion is approximately one-sixteenth inch from the forward position, the gun is ready to fire (fig. 26). If the trigger



RA PD 50962

Figure 27—Automatic Firing

FUNCTIONAL OPERATION



RA PD 50963

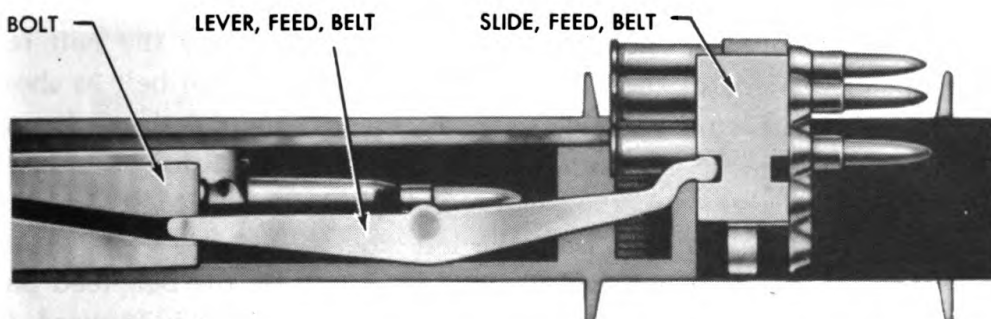
Figure 28—Belt Feed Mechanism, Bolt In Forward Position

is not depressed at this instant, the recoiling portion assumes its final forward position and the gun ceases to fire. The parts are now in the position shown in figure 12 and the gun is again ready to fire.

(e) *Automatic Firing.* For automatic firing, the trigger is pressed and held down. The sear is depressed as its tip is carried against the cam surface of the trigger bar by the forward movement of the bolt near the end of the counterrecoil stroke (fig. 27). The notch in the bottom of the sear releases the firing pin extension and the firing pin, thus automatically firing the next cartridge at the completion of the forward stroke. The gun fires automatically as long as the trigger is held down and until the ammunition supply is exhausted.

(f) *Feeding.*

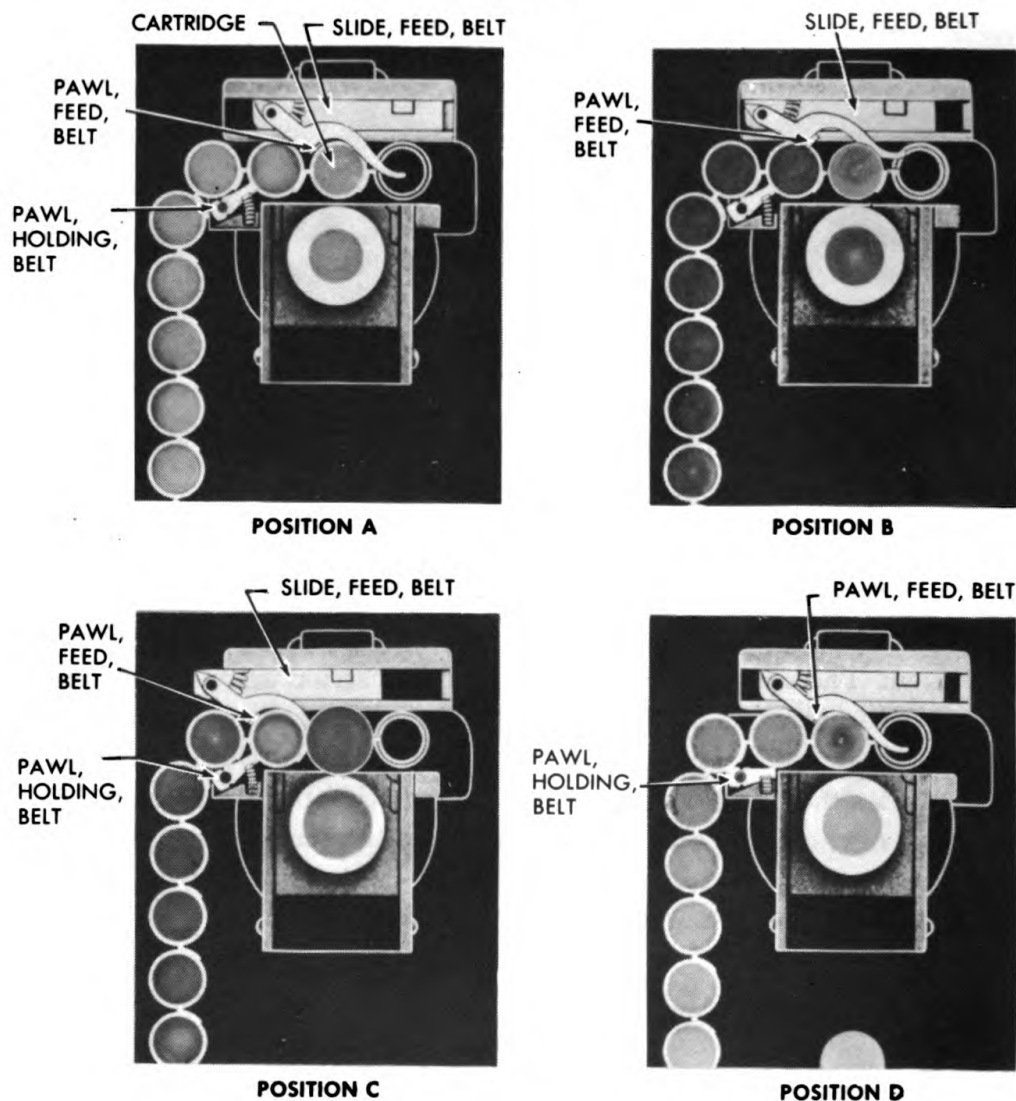
1. The belt feed mechanism is actuated by the bolt. When the bolt is in the forward position, the belt feed slide is within the confines of the gun. A lug on the rear of the belt feed lever is engaged in the diagonal cam groove in the top of the bolt. Figure 28 shows the mechanism as from above with the cover removed.



RA PD 50964

Figure 29—Belt Feed Mechanism, Bolt In Rearward Position

ORDNANCE MAINTENANCE—BROWNING MACHINE GUN, CAL. .50, ALL TYPES



RA PD 50965

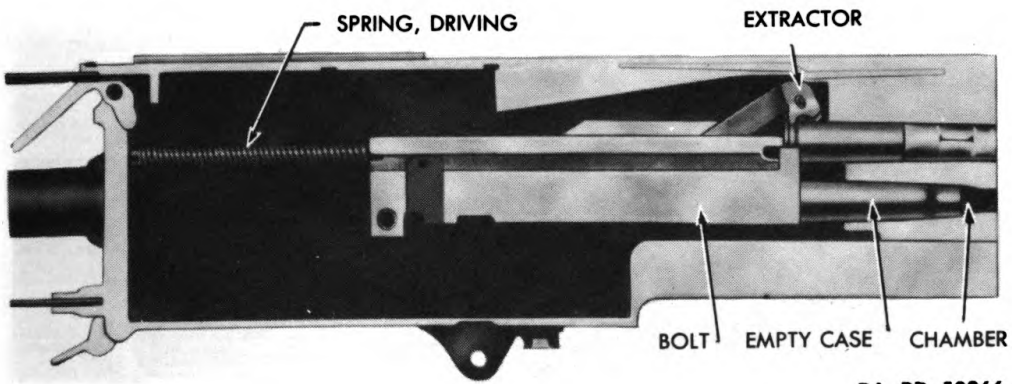
Figure 30—Belt Feed Mechanism

2. As the bolt moves rearward during recoil, the belt feed lever is pivoted. The forward end of the belt feed lever moves the belt feed slide out of the side of the gun and over the ammunition belt as shown in figure 29. Ammunition feed, as shown, is from the left side of the gun. Feed from either side is possible with all cal. .50, M2 Guns.

NOTE: On previous models, namely, the M1921 and M1921A1, ammunition could be fed from only the left side.

3. The ammunition belt is pulled into the gun by the belt feed pawl which is attached to the belt feed slide. When the belt is forward, the belt feed pawl has positioned a cartridge directly above the chamber. The belt holding pawl is in a raised position to prevent the ammunition belt from falling out of the gun (fig. 30-A).

FUNCTIONAL OPERATION

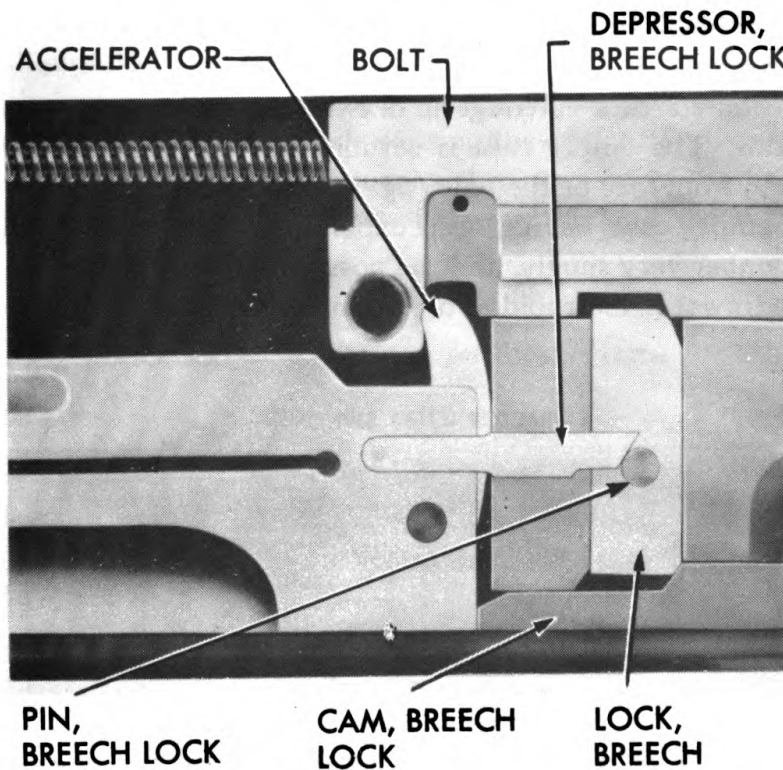


RA PD 50966

Figure 31—Extracting Cartridge At Start Of Recoil

4. As the bolt recoils, the belt feed slide is moved out over the belt, and the belt feed pawl pivots so as to ride over the link holding the next cartridge in the belt (fig. 30-B).

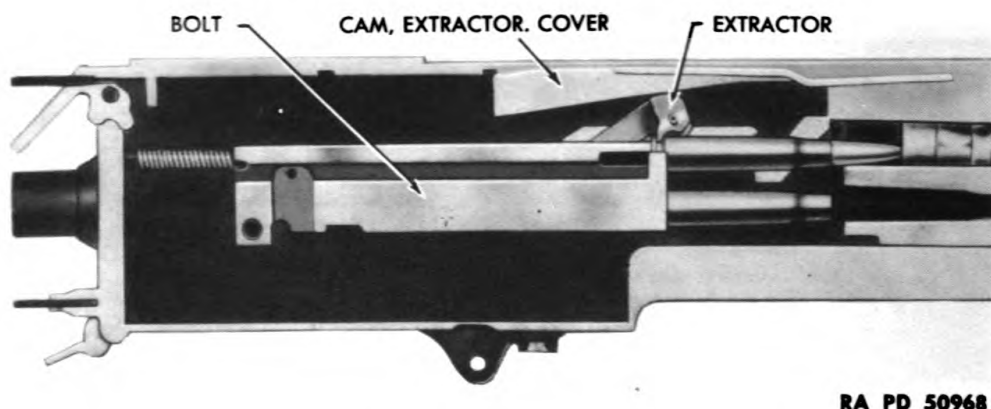
5. At the end of the recoil stroke, the travel of the belt feed slide is sufficient to permit the belt feed pawl to snap down behind the link



RA PD 50967

Figure 32—Beginning Of Unlocking

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RA PD 50968

Figure 33—Cartridge Entering T-Slot

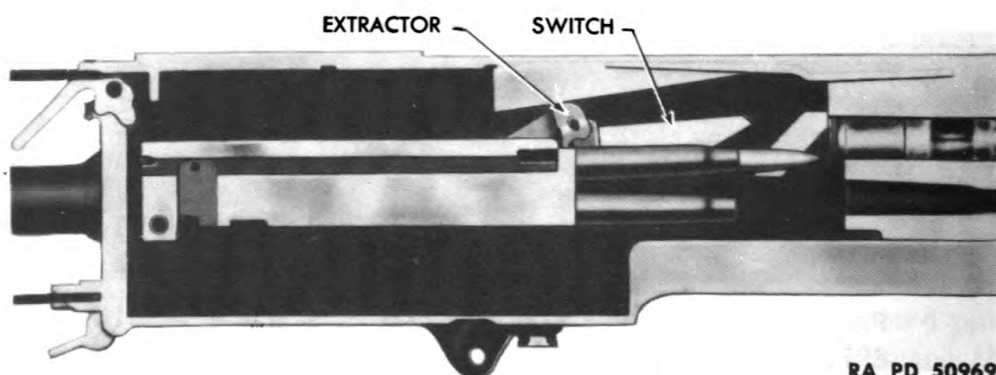
holding the next cartridge in order to pull the belt into the gun (fig. 30-C).

6. As the bolt moves forward on the counterrecoil stroke, the belt is pulled into the gun by the belt feed pawl. The belt holding pawl is forced downward as the belt is pulled over it. When the forward stroke of the belt is completed, the belt holding pawl snaps up behind the next cartridge, as shown in figure 30-D.

(g) Extracting And Ejecting.

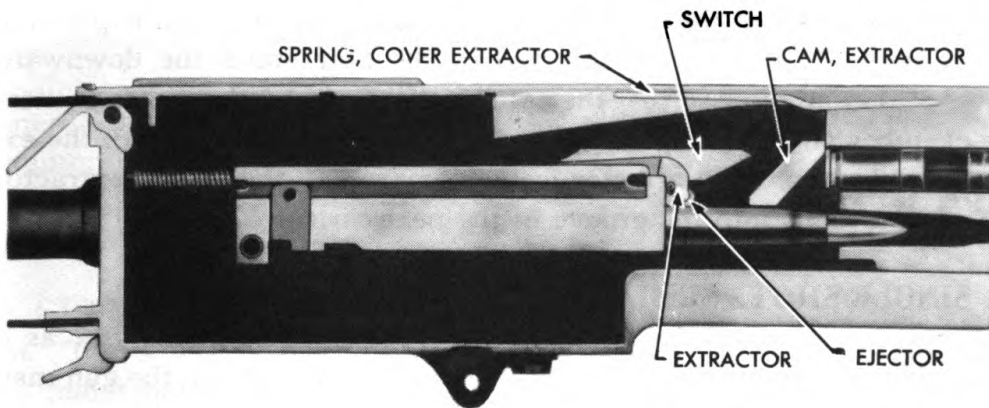
1. As recoil starts, a cartridge is drawn from the ammunition belt by the extractor. The empty case is withdrawn from the chamber by the T-slot in the front face of the bolt (fig. 31).

2. The empty case, having been expanded by the force of explosion, fits the chamber very snugly, and the possibility exists of tearing the case if the withdrawal is too rapid. To prevent this and to insure slow initial



RA PD 50969

Figure 34—Ejecting

FUNCTIONAL OPERATION

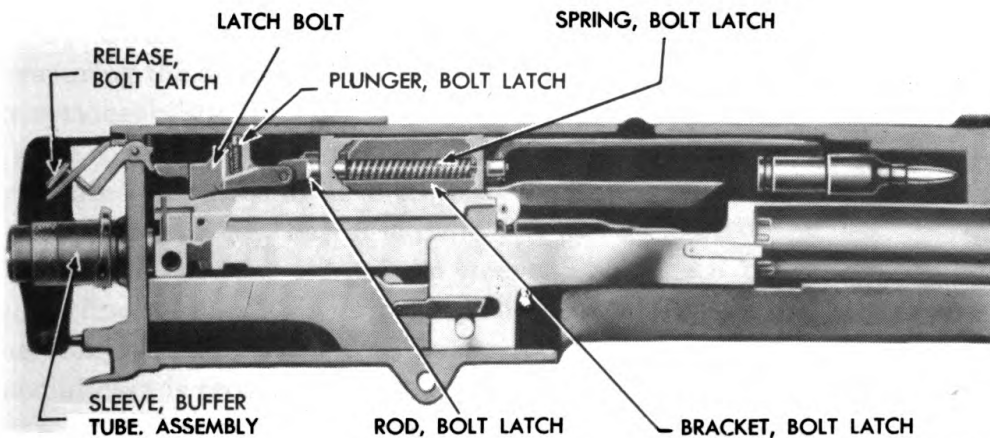
RA PD 50970

Figure 35—Chambering

withdrawal, the top front edge of the breech lock and front side of the notch in the bolt are beveled. Thus, as the breech lock is unlocked, the bolt moves away from the barrel and barrel extension in a gradual manner (fig. 32).

3. As the bolt moves to the rear, the cover extractor cam forces the extractor down, causing the cartridge to enter the T-slot in the bolt as shown in figure 33.

4. As the extractor is forced down, a lug on the side of the extractor rides against the top of the switch, causing the switch to pivot downward at the rear. Near the end of the rearward movement of the bolt, the lug on the extractor overrides the end of the switch, and the switch snaps to its normal position (fig. 34).



RA PD 51018

Figure 36—Bolt Latched In Rear Position

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5. On the counterrecoil stroke, the extractor is forced farther down by the extractor lug riding under the switch. The cartridge expels the empty case. The extractor stop pin in the bolt limits the downward travel of the extractor so that the cartridge, assisted by the ejector, enters the chamber (fig. 35). When the cartridge is nearly chambered, the extractor rides up the extractor cam, compresses the cover extractor spring, and snaps into the groove in the next cartridge.

7. SINGLE-SHOT, SEMIAUTOMATIC OPERATION.

a. Under some conditions, it is desirable to operate this gun as a single-shot, semiautomatic weapon. To meet this condition, the gun may be equipped with a bolt latch. At present, the heavy barrel gun is the only gun so equipped. The bolt latch is attached to the bolt latch bracket, which is riveted to the underside of the top plate and the right-hand side plate. The latch engages a shoulder on the top of the bolt when the bolt is in its rearward position. A bolt latch release which controls the latch is provided (fig. 36).

b. With the bolt latch installed, the bolt, as it moves to the rear, is engaged and held there. When the bolt latch release is pressed down, the latch assembly is raised to allow the bolt to be driven forward to the battery position. The gun may then be fired by pressing the trigger. If both the bolt latch release and trigger are held down, the gun will function as an automatic weapon. The bolt latch release may be locked in the depressed position by means of a lock secured to the back plate group.

Section IV

TOOLS AND GAGES

	Paragraph
General	8
Common tools	9
Special tools	10
Accessories	11

8. GENERAL.

a. The tools and gages used in the disassembly, assembly, inspection, and maintenance of cal. .50 Browning machine gun are listed in SNL A-35 and pertinent standard nomenclature lists. These tools and gages are included as part of the equipment of the armorer's tool chest. This equipment will be considered under three headings, namely: common tools, special tools, and accessories. Use of tools and gages is described in detail in sections VII and VIII.

b. All inspection gages must be inspected by an arsenal yearly.

9. COMMON TOOLS.

a. These include the common tools, such as screwdrivers, drifts, pliers, hammers, etc., which normally are used in the maintenance and repair of such material. Their uses are self-evident and require no discussion. Fine-grained sharpening stones, in special shapes and sizes, are available for use in removing burs and smoothing working surfaces.

10. SPECIAL TOOLS.

a. A number of special tools, inspection tools, and gages, have been developed particularly for use with this weapon. These special tools may be described as follows:

(1) GAGE, BREECH BORE, C20623 (fig. 37). The bore gage is used for measuring the advancement of the forcing cone in the barrel to determine its serviceability. The complete unit consists of an assembly made up of a gage, sleeve, knob, and taper pin. The gage is provided with index lines graduated in tenths of an inch for a distance of 4 inches. The maximum bullet seat in a new barrel is indicated when the zero line on the gage is alined with the long side of the sleeve. The gage is provided with a red index line at the 2.0-inch mark. When the red index line is alined with the long side of the sleeve, the barrel is considered unserviceable. No special care is required beyond that normally given to gages, such as rust prevention and protection from nicks and burs. See paragraph 38 c (1) for detailed instructions on this page.

(2) GAGE, FIRING PIN HOLE, 0.084-INCH, A77200. The firing pin hole gage is used to determine the serviceability of the bolt (fig. 38). This

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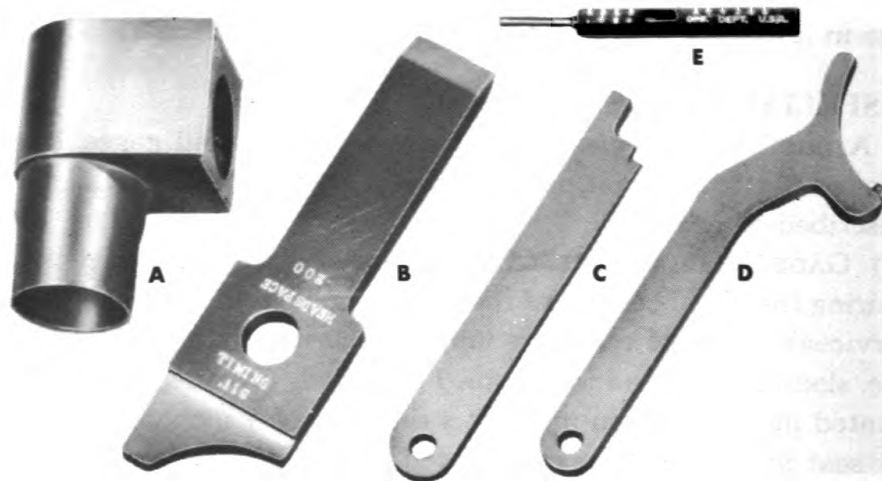
RA PD 50971

Figure 37—Breech Bore Gage Cal. .50, M1

is a "NO-GO" gage, and if the gage can be inserted into the firing pin hole, the bolt is unserviceable. All such bolts that are otherwise serviceable should be forwarded to Rock Island Arsenal for replacement of the recoil plate.

(3) GAGE, HEADSPACE AND TIMING, A196228. This combination gage is used to check headspace adjustment and the timing of the firing mechanism (fig. 38). See paragraphs 31 and 32 for detailed instructions on this gage.

(4) GAGE, HEADSPACE AND TIMING, ASSEMBLY, A351217. This assembly is composed of a double ended "GO" and "NO-GO" headspace



A—REFLECTOR, BARREL, CAL. 50—C64255

B—GAGE, HEADSPACE AND TIMING, CAL. .50—A196228

C—WRENCH, HOLDING, BARREL—A152640

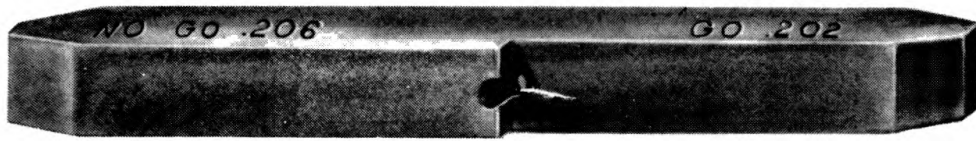
D—WRENCH, ADJUSTING, PACKING RING—A152639

E—GAGE, FIRING PIN HOLE, CAL. .50—A77200

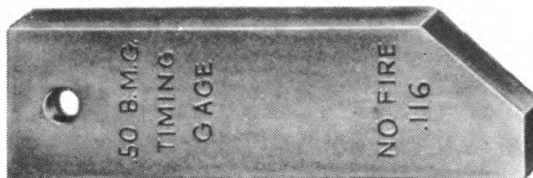
RA PD 50972

Figure 38—Special Tools And Gages

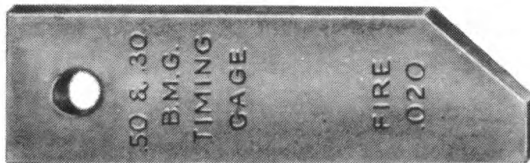
TOOLS AND GAGES



HEADSPACE GAGE, CAL. .50 (A351211)



TIMING GAGE, CAL. .50 (A351213)



TIMING GAGE, CAL. .50 (A351214)

RA PD 65581

Figure 39—Headspace And Timing Gages Comprising Assembly A351217

gage A351211 fastened by a chain to a double leaf timing gage. One leaf is a "FIRE" gage A351214, and the other a "NO-FIRE" gage A351213. The components of the assembly are shown in figure 39, and their use explained in paragraphs 31 e and 32 d, respectively.

(5) REFLECTOR, BARREL, INSPECTOR'S, C64255. The inspector's barrel reflector, illustrated in figure 38, is used for the visual inspection of the barrel and in bore sighting.

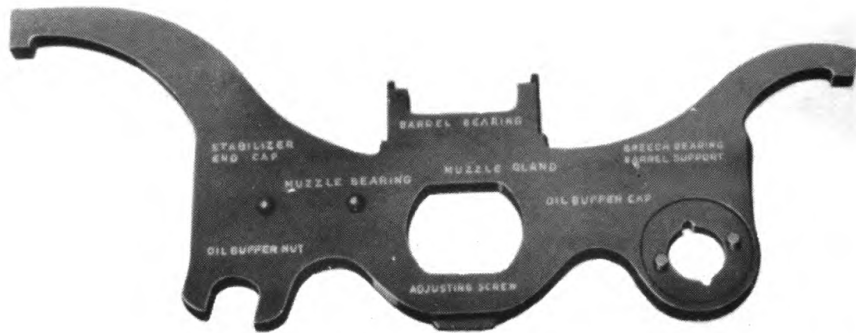
(6) WRENCH, ADJUSTING, PACKING RING, A152639. This wrench is used with water-cooled guns to adjust the packing ring on the breech end of the barrel (fig. 38).

(7) WRENCH, HOLDING, BARREL, A152640. This wrench is used to keep the barrel from turning when using the packing ring adjusting wrench A152639 to adjust the rear barrel packing (fig. 38).

(8) WRENCH, COMBINATION, CAL. .50, M2, D28242. This is a special tool used for disassembling, assembling and making adjustments on the guns (fig. 40). Each opening and projection is marked to show its purpose.

(9) WRENCH, PIPE, STRAP, C67217, CAPACITY, 2 TO 5 INCHES. This is used in removing the water jacket (fig. 41).

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RA PD 50973

Figure 40—Combination Wrench, Cal. .50, M2

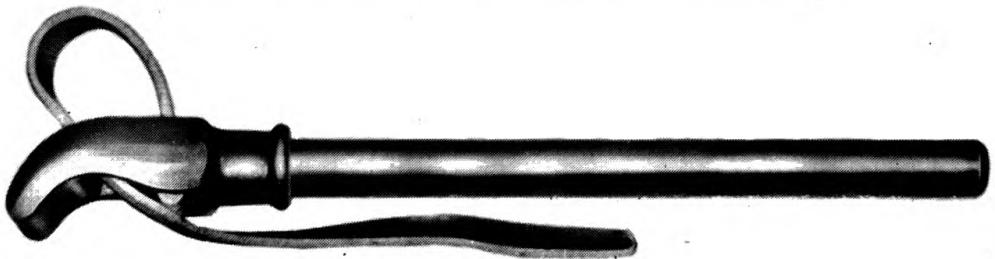
(10) **TOOL, DISASSEMBLING, FIRING PIN SPRING, B243646.** This tool is for the purpose of disassembling the firing pin spring from the firing pin extension and assembling it thereto (fig. 42).

11. ACCESSORIES.

a. Various accessories are provided for use in the cleaning and maintenance of the weapon. The names or general characteristics of most of these accessories indicate their use and application. The following are among the most commonly used accessories:

(1) **ROD, CLEANING.** Both one-piece and jointed cleaning rods are provided for the care of the bore. A fabric case is available for the jointed rods. For part numbers of rods and other accessories, refer to pertinent standard nomenclature list.

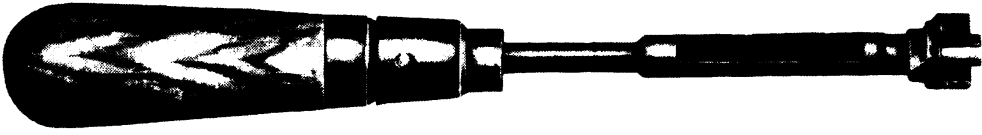
(2) **BRUSH, CLEANING, CAL. .50, M4, C4037.** The brush consists of the core, bristles, and tip. The brass wire core is twisted in a spiral, and holds the bronze bristles in place. The core is secured in the brass tip which is threaded for attaching the brush to the cleaning rod.



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Figure 41—Strap Pipe Wrench, Capacity, 2 To 5 Inches

TOOLS AND GAGES



RA PD 68443

Figure 42—Firing Pin Spring Disassembling Tool—Head Partly Cut Away To Show Construction

(3) MACHINE, LINK LOADING, CAL. .50, M2, D8794. The link loading machine is used for rapid loading of ammunition into metallic links. Links, properly assembled, are placed on the loading bed adjacent to the stops, and cartridges are placed in the grooves provided. The loading is performed by the operation of the loading handle which, when pushed forward to the stop, will load the cartridges to the correct depth in the links.

(4) See pertinent standard nomenclature list for complete list of accessories.

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Section V

PRELIMINARY INSPECTION

	Paragraph
Safety precautions	12
General instructions for inspection	13
Purpose of preliminary inspection	14
The gun as a unit	15
Headspace and timing	16

12. SAFETY PRECAUTIONS.

a. Before inspecting the weapon, raise the cover and retract the bolt sufficiently to make sure there are no cartridges in the feedway, T-slot, or chamber. Never cock the gun against the tension of driving springs with the back plate removed from the gun, as serious injury to personnel may result if the retaining pin disengages from the receiver.

13. GENERAL INSTRUCTIONS FOR INSPECTION.

a. Inspection serves the purpose of determining the condition of the materiel, whether repairs or adjustments are required, and the remedies necessary to insure that the materiel is in operable condition. Before inspection is begun, the materiel should be properly cleaned to remove any grease, dirt, or foreign matter which might interfere with its proper functioning or obscure the true condition of the parts.

14. PURPOSE OF PRELIMINARY INSPECTION.

a. Preliminary inspection should be distinguished from complete inspection which is explained in section VII of this manual. It is often desirable to determine the general condition of weapons when complete disassembly of the parts is not possible or desirable. When malfunctions develop, it is also important that the gun be inspected and pertinent information recorded before the gun is disassembled. Such data will be very helpful in determining the true cause of improper operation of the weapon and in correcting the trouble.

15. THE GUN AS A UNIT.

a. Check general appearance. Note smoothness of operation by pulling the retracting (operating) slide to the rear and releasing. Check adjusting screw in the back plate for tightness. Observe the operation of the cover latch, making sure there is sufficient tension on the spring to keep the cover securely latched. Raise the cover and check the action

PRELIMINARY INSPECTION

of the cover detent pawl. Move the belt feed lever from side to side, making sure the belt feed mechanism moves freely in its full travel in both directions. Check the bolt for evidence of rust, and inspect the extractor and ejector. Make sure the screws at the front of the barrel jacket and those used in attaching the retracting (operating) slide are properly in place, and that no cotter pins or locking wires are missing.

b. If a gun is damaged by an accident, a complete report must be sent to the ordnance office. Instructions for the disposition of damaged parts will then be forwarded by the ordnance office.

16. HEADSPACE AND TIMING.

a. Guns which have developed malfunctions should be carefully checked for headspace and timing before the weapons are disassembled. Detailed procedure for checking headspace, using gage A196228, is explained in paragraph 31. Procedure for checking timing, using the same gage, is explained in paragraph 32. Procedure for checking headspace and timing with recently issued gage assembly A351217 is explained in paragraphs 31 and 32.

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Section VI

DISASSEMBLY AND ASSEMBLY

	Paragraph
General	17
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Back plate groups, disassembly and assembly	19
Bolt group disassembly and assembly	20
Oil buffer group disassembly and assembly	21
Barrel extension group disassembly and assembly	22
Cover group disassembly and assembly	23
Casing group disassembly and assembly	24
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Side plate trigger assembly, disassembly and assembly	28
Combination rear sight group disassembly and assembly	29
Reinstallment of groups	30
Headspace adjustment and checking	31
Timing check	32

17. GENERAL.

a. Disassembly and assembly of the weapon can be handled most efficiently if the gun is placed in rigid mounts attached to a substantial table. The beginner will find it helpful to lay parts out neatly in order as they are removed from the gun. In that way he will become familiar with the parts and their order of assembly under favorable conditions. After he becomes more adept at disassembly and assembly, he can arrange his procedure to the best advantage. It is further suggested that parts for each gun be kept intact and separated from those of other guns. Although parts are interchangeable, they will work together best in their original combination.

b. **Tools For Disassembly And Assembly.** These operations can be handled most conveniently with the use of the following tools:

DRIFT, $\frac{1}{16}$ -in. diam
DRIFT, $\frac{1}{8}$ -in. diam
HAMMER, machinist's
PLIERS, needle-pointed
SCREWDRIVER, 8-in. long

SCREWDRIVER, 16-in. long
WRENCH, adjustable end, 1-in.
opening
WRENCH, combination, M2,
D28242

DISASSEMBLY AND ASSEMBLY

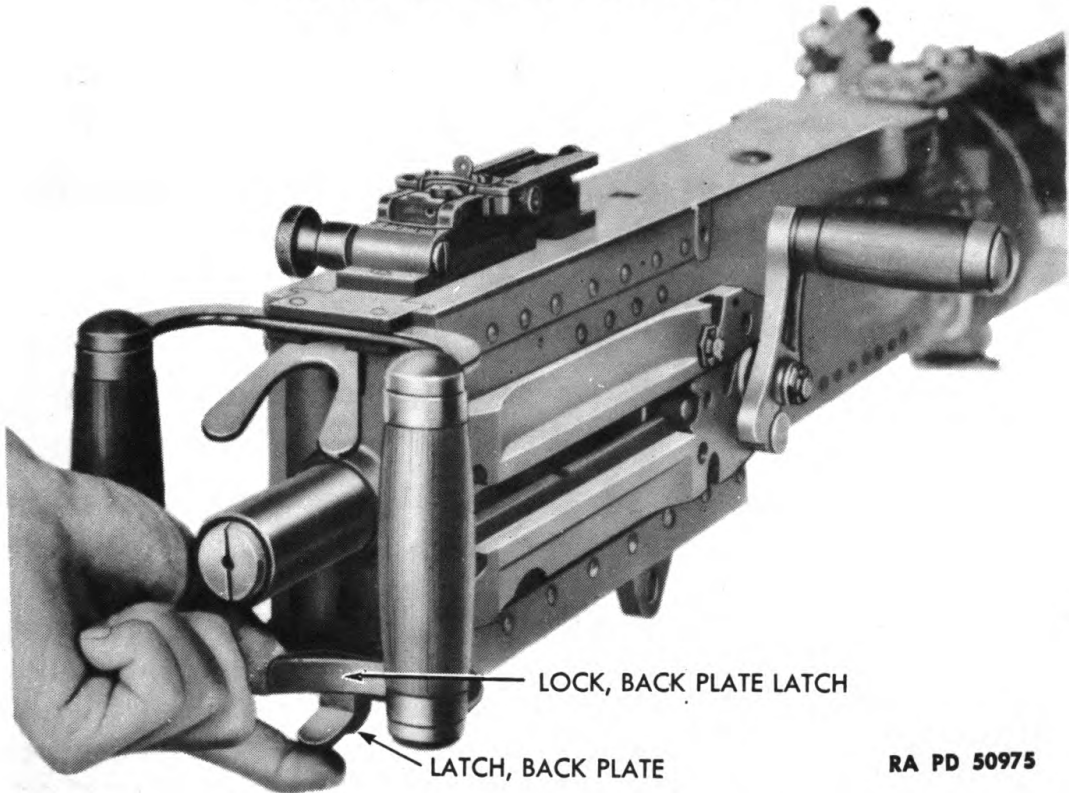


Figure 43—Removing Back Plate Assembly

c. In this section, the main groups of parts and assemblies are removed from the gun first; then, each group is disassembled and assembled, and finally the groups reinstalled in the gun. (A "group" is a number of parts or assemblies, or both, which either function together in the gun or are intimately related to each other and should, therefore, be considered together.)

d. When assembling parts, new cotter pins and locking wires should be used if available, and damaged or badly worn parts replaced by new ones.

18. REMOVAL OF GROUPS.

a. Raise the cover and make sure there is no cartridge in the feedway, T-slot, or chamber. If the gun is equipped with a bolt latch, press the bolt latch release.

b. **Back Plate Group.** Release the back plate latch lock, pull up on the back plate latch, and slide the back plate up out of the receiver (fig. 43).

c. **Bolt Group.**

(1) Pull the driving spring rod assembly about $\frac{3}{8}$ inch to the left, which removes it from the positioning hole in the right side plate as shown

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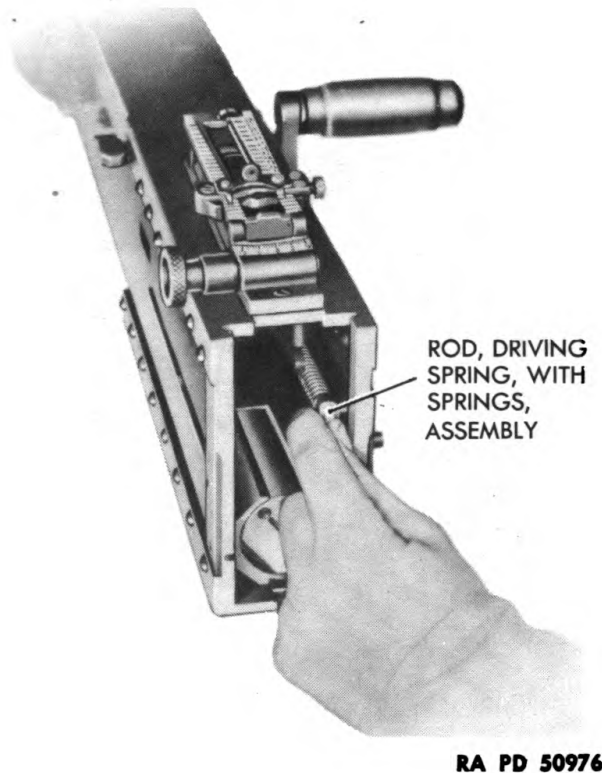
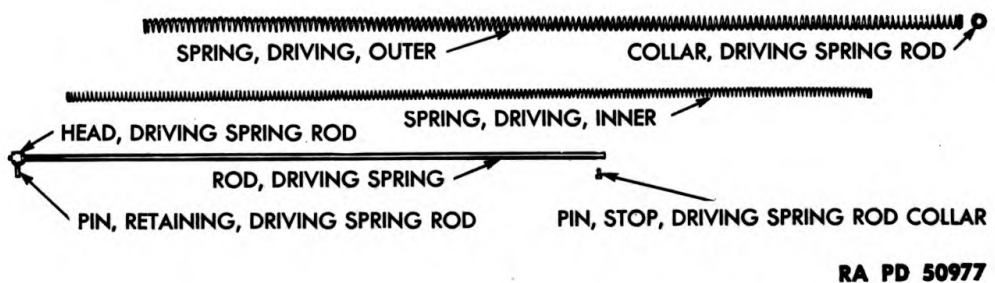


Figure 44—Removing Driving Spring Rod, With Springs, Assembly

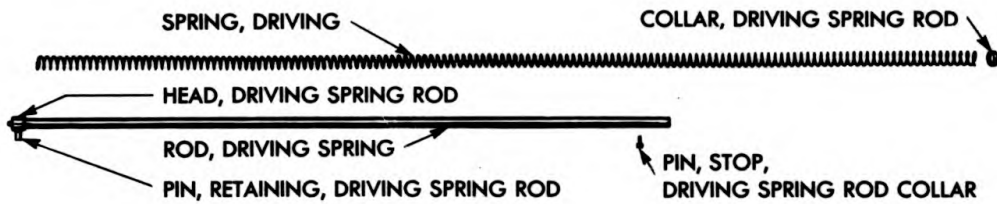
in figure 44. The slight force of the spring will tend to move it to the rear, and the driving spring rod assembly may then be removed from the gun. Exploded view of M2 driving spring rod assembly with inner and outer springs is shown in figure 45. Exploded view of M1921 and 1921A1 driving spring rod assembly with single spring is shown in figure 46.

(2) Pull the bolt to the rear until the bolt stud aligns with the enlarged assembly hole in the side plate, and remove the stud as shown



**Figure 45—Driving Spring Rod, With Springs, Assembly—
Exploded View**

DISASSEMBLY AND ASSEMBLY



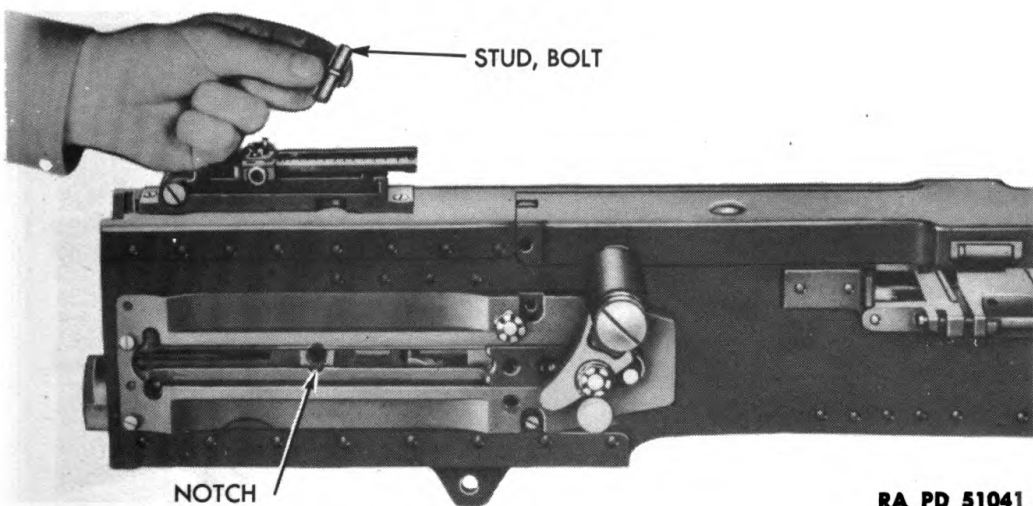
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Figure 46—M1921 And M1921A1 Driving Spring Rod, With Spring, Assembly

in figure 47. The bolt is slid to the rear and removed from the gun (fig. 48).

d. **Oil Buffer, Barrel Extension And Barrel Groups.** Insert a drift in the hole near the rear of the right side plate and depress the oil buffer body spring lock as shown in figure 49. At the same time, push the barrel, barrel extension, and oil buffer group to the rear, and pull from the receiver. (NOTE: This is not possible with the heavy barrel gun until the barrel has been unscrewed and removed from the front to release the barrel extension. The water jacket of the water-cooled gun should be drained before removing the barrel.) The oil buffer group is disconnected from the barrel extension by pushing forward on the tips of the accelerator as shown in figure 50.

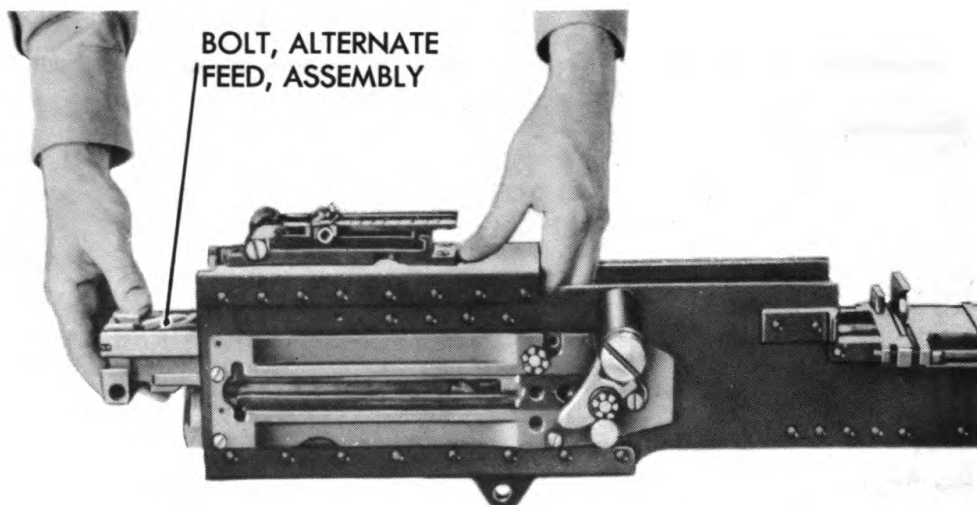
e. **Barrel And Barrel Extension Group.** The barrel extension is unscrewed from the barrel. Before the barrel of an M1921 Gun can be



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Figure 47—Removing Bolt Stud

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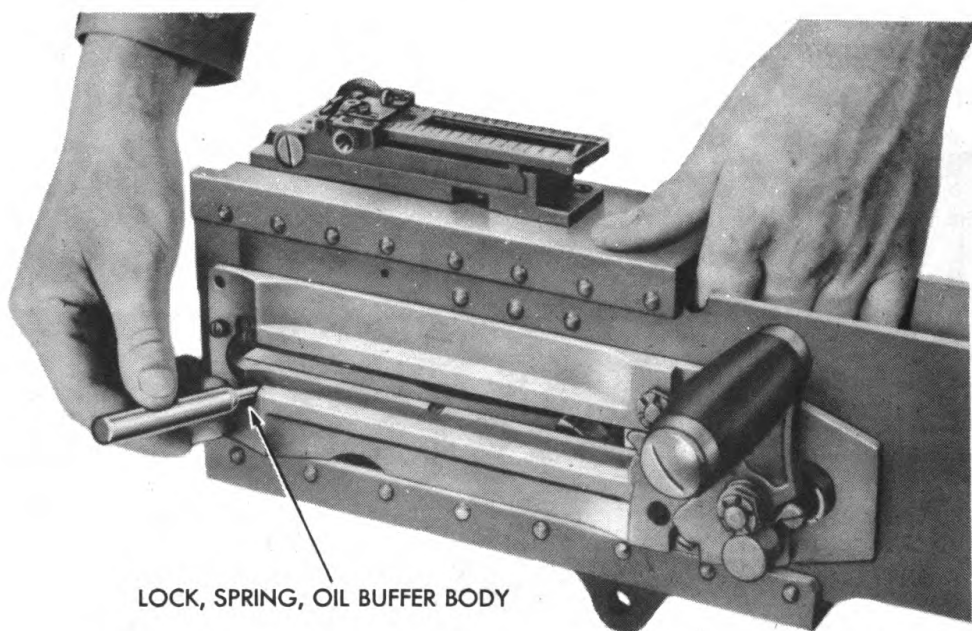


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Figure 48—Removing Alternate Feed Bolt Group

unscrewed, the barrel locking spring must be removed or held out of engagement. The various types of cal. .50 barrels are shown in figure 51.

f. **Cover Group.** Close the cover and remove cotter pin from the cover pin. Remove cover pin from receiver (fig. 52). Unlatch the cover and rotate it upward and forward to remove it from the trunnion block.



RA PD 50981

Figure 49—Releasing Oil Buffer Body Spring Lock

DISASSEMBLY AND ASSEMBLY

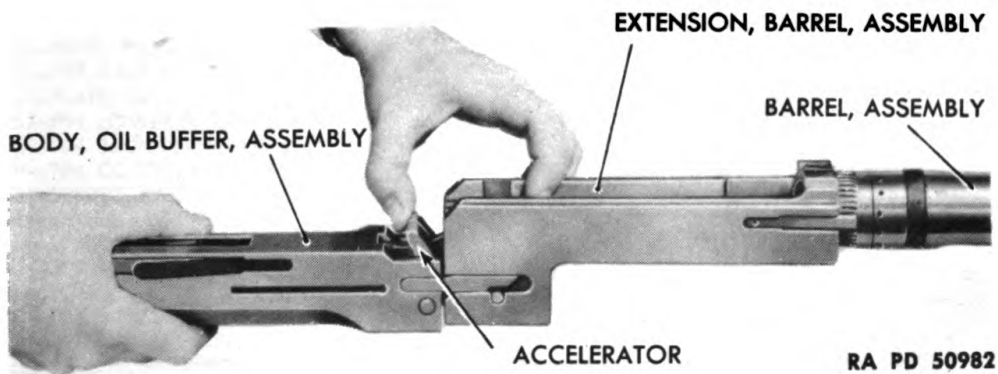


Figure 50—Removing Oil Buffer Group

g. Receiver And Barrel Jacket Group. The operations described above leave only the receiver and barrel jacket group intact. Disassembly and assembly of the various groups will be explained in the following paragraphs.

19. BACK PLATE GROUPS, DISASSEMBLY AND ASSEMBLY.

a. Back Plate With Horizontal Buffer Assembly.

(1) **DISASSEMBLY.** Loosen back plate adjusting screw, using combi-

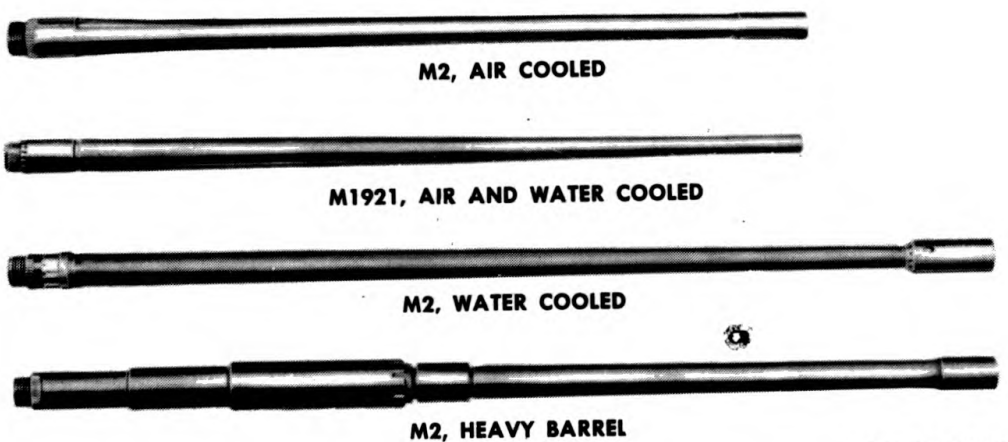
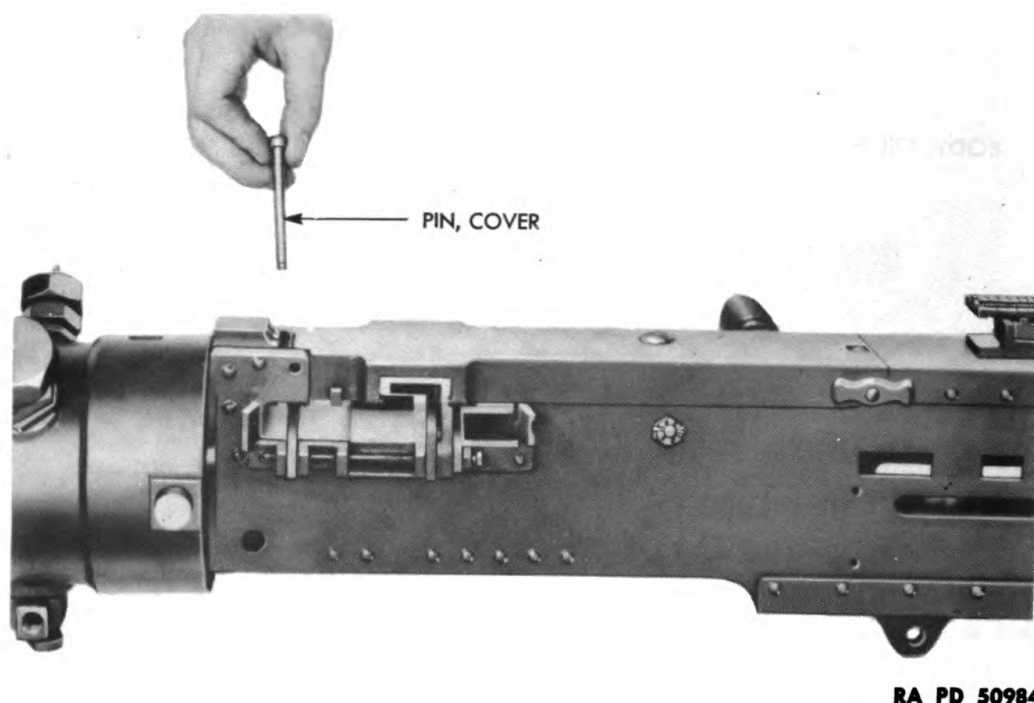


Figure 51—Types Of Barrels

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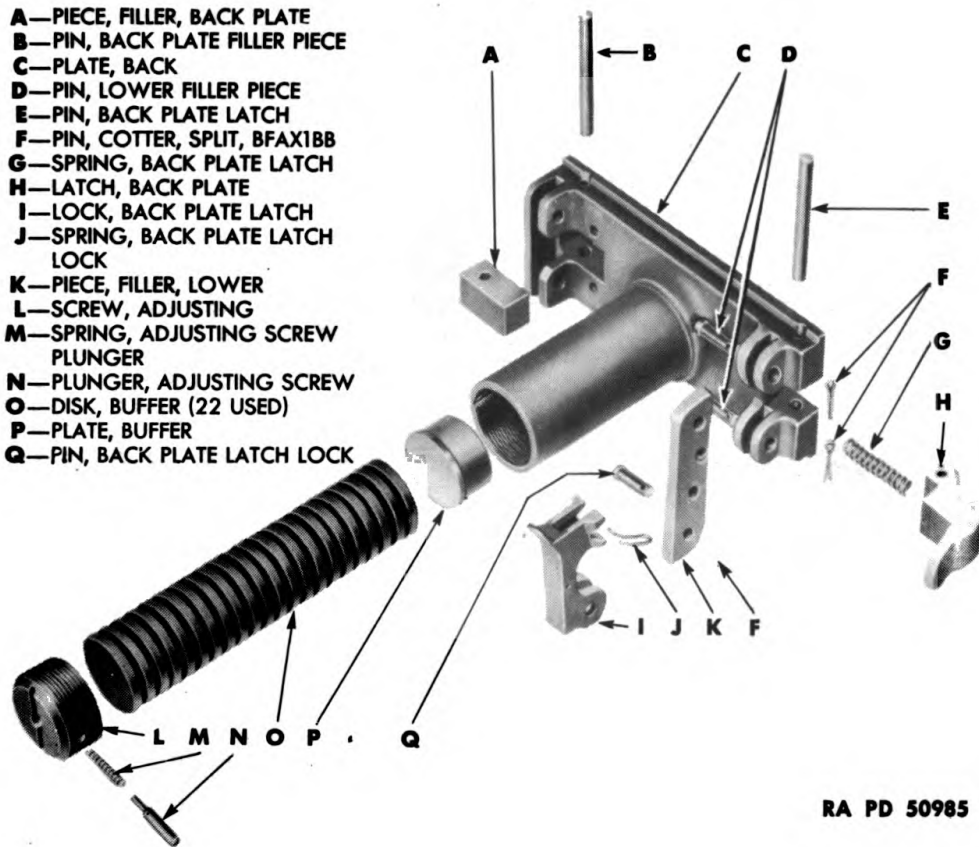
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Figure 52—Removing Cover Pin

nation wrench M2, D28242. With the large screwdriver, remove the adjusting screw, taking care not to lose the adjusting screw plunger and spring when they are released as the adjusting screw moves out. Remove buffer disks and buffer plate. With the small drift, force out the back plate filler piece pin and remove the back plate filler piece. The back plate latch is removed by forcing out the back plate latch pin. Do not lose the spring. Remove the latch lock by taking out the cotter pin and removing the pin. If desired, the latch lock spring can be removed by compressing the sides of the spring. Detach the lower filler piece by removing the cotter pins and taking out the 2 filler piece pins. All parts, in their relative position as removed from the back plate, are shown in figure 53.

(2) **ASSEMBLY.** Place the lower filler piece in the back plate with extension to left, or right, depending upon side to which latch lock is to be attached, insert the 2 filler piece pins from the top, and insert cotter pins. Assemble the back plate latch to back plate by inserting the back plate latch spring in the latch recess, with the other end of the spring in the recess in the lower filler piece. The latch is pressed forward between the thumb and forefinger, and the pin inserted. Assemble the latch lock spring in the latch lock, with the bowed side of spring bulging toward the latch lock, and closed end toward the pin end of the lock.

DISASSEMBLY AND ASSEMBLY

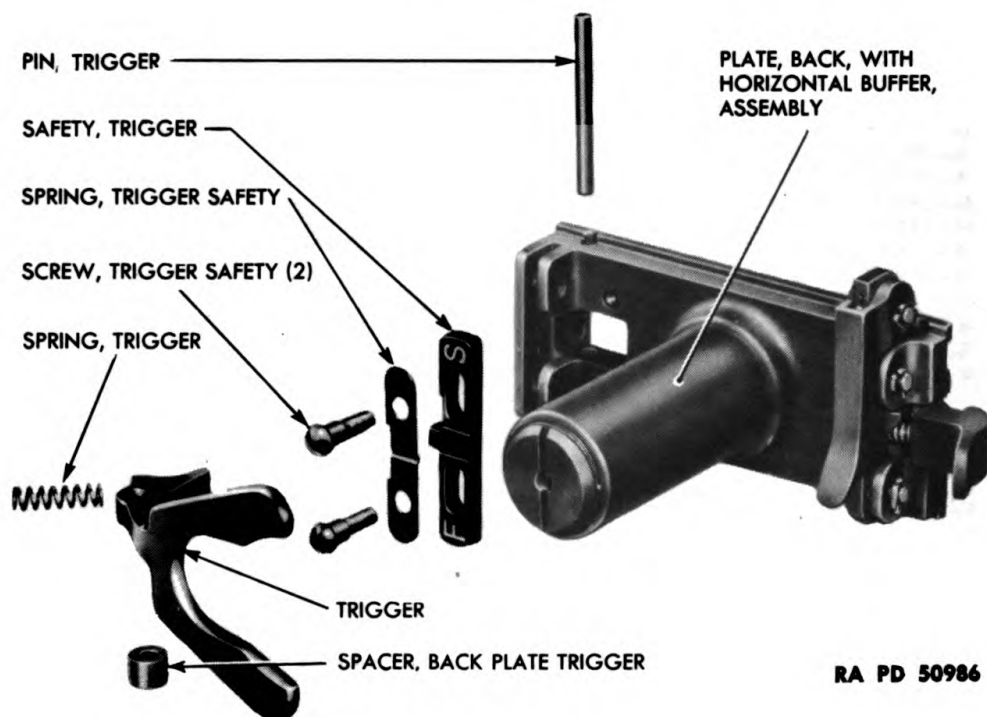


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Figure 53—Back Plate With Horizontal Buffer Assembly (For Fixed Guns)—Exploded View

Insert the 2 ends of the spring in the small holes in the latch lock. Attach latch lock to filler piece extension by inserting latch lock pin from the top and inserting cotter pin. (The latch lock is normally attached with the pin to the left; however, if an operating slide is to be attached to the right side of the receiver, the latch lock is attached to the left side by reversing the lower filler piece. This provides hand clearance when operating the slide.) Place the buffer plate in the back plate with the small diameter forward and projecting from the front of the back plate. Insert 22 buffer disks, making sure they are seated properly, and start the adjusting screw. Insert the plunger and spring, depress them so the plunger may enter the tube, and tighten the adjusting screw using the combination wrench. If, after tightening, the adjusting screw extends less than one-sixteenth inch from the back plate, remove the adjusting screw, add one more buffer disk and replace the adjusting screw, plunger, and spring. Tighten securely. Place the back plate filler piece in its opening in the back plate and insert the pin.

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Figure 54—Back Plate With Horizontal Buffer Assembly (For Water-Cooled Guns)—Partly Exploded View

b. Back Plate With Horizontal Buffer And Trigger Group.

(1) DISASSEMBLY.

(a) This is identical with the back plate described in subparagraph a, above, except for the addition of trigger group and removal of the back plate filler piece. All trigger parts, in their relative position as removed from the back plate, are shown in figure 54. Procedure is the same as given previously, except for the disassembly and assembly of the trigger group which follows.

(b) Start trigger pin with a drift and remove it with pliers. Remove trigger, trigger spring, and trigger spacer, taking care not to lose the spring when the pin is removed. If it is necessary to remove the trigger safety assembly, it can be taken off by removing the 2 staked screws.

(2) **ASSEMBLY.** If the trigger safety assembly has been removed, reassemble the safety and safety spring, and attach to the back plate with the 2 screws which should be staked after being tightened. Insert the trigger in its recess with the trigger spacer to the left. Seat the spring in the holes in the back plate and trigger, aline the holes and insert the pin.

c. Spade Grip Back Plate. All parts of this assembly, in their relative position, are shown in figure 55-A.

DISASSEMBLY AND ASSEMBLY

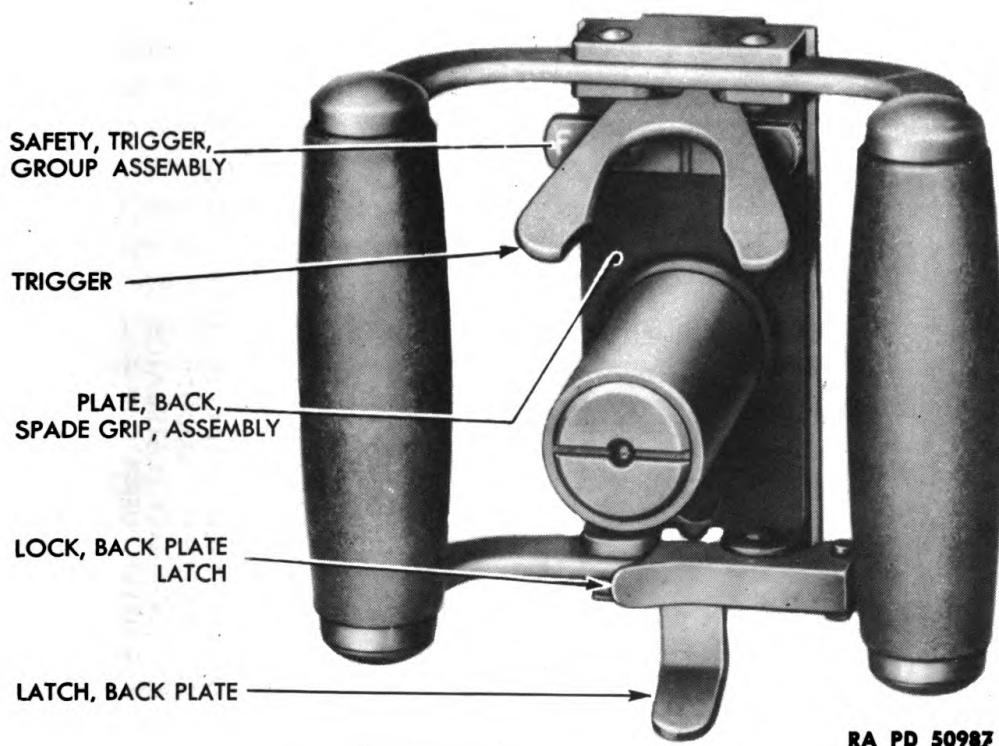


Figure 55-A—Spade Grip Back Plate Assembly

(1) **DISASSEMBLY.** Follow the procedure given in subparagraph a (1), above, except for removal of lower filler piece and back plate filler piece. Disassembly of the trigger group is described in subparagraph b (1) (b), above.

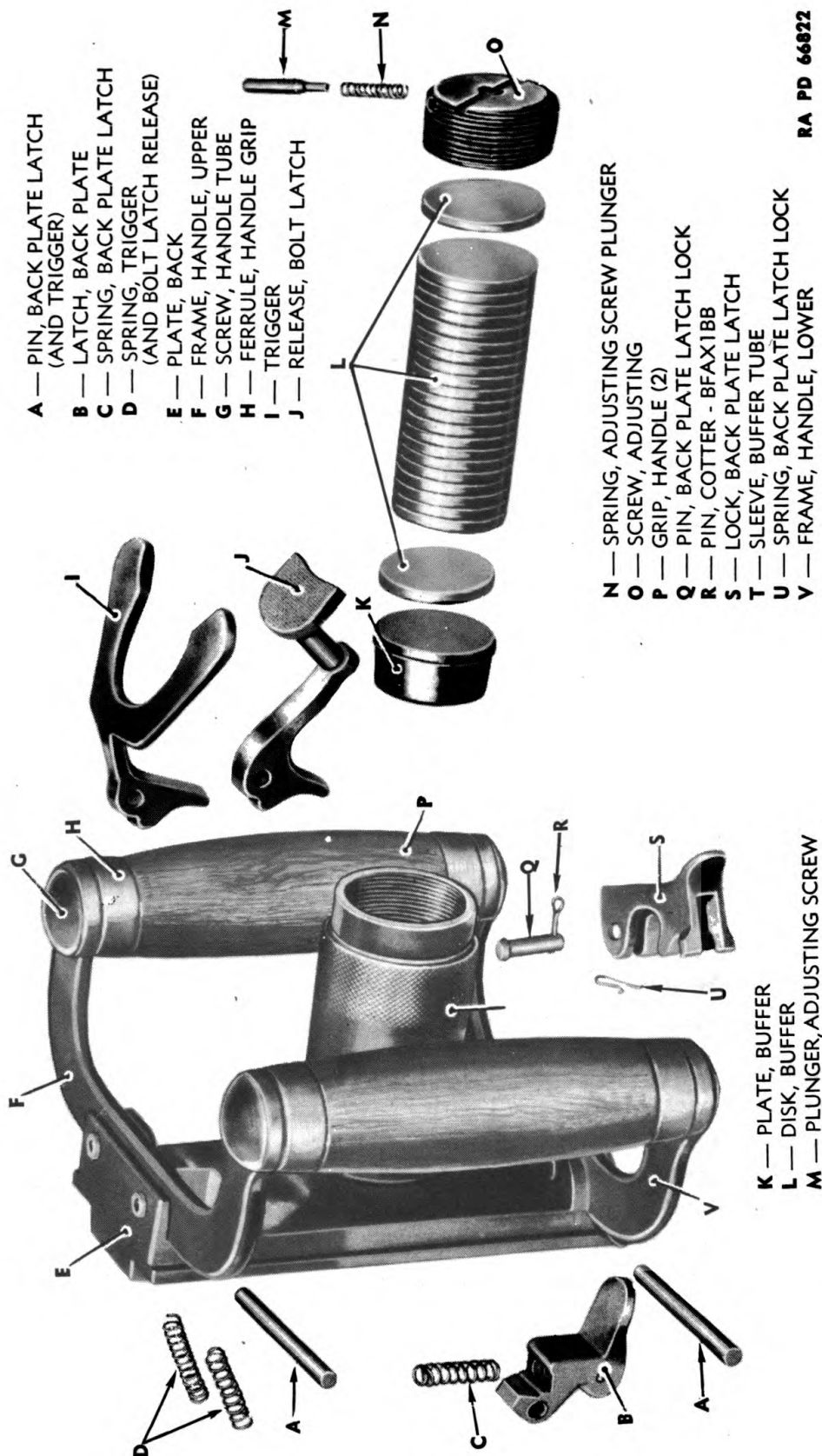
(2) **ASSEMBLY.** Same as subparagraph a (2), above, except for assembly of back plate filler piece and lower filler piece. Latch lock is attached to the lower handle frame, which is riveted to the back plate. Assembly of the trigger group is outlined in subparagraph b (2), above.

d. Spade Grip Back Plate With Bolt Latch Release (Heavy Barrel Guns). This back plate is used with heavy barrel guns assembled with a bolt latch (fig. 36). It is similar to the spade grip back plate shown in figure 55-A, except that it is without a trigger safety and has a bolt latch release assembled with the trigger, and a sleeve assembled to the back plate tube. The lock on the sleeve is for the purpose of holding the bolt latch out of engagement when the gun is firing automatically, and is operated by turning the sleeve, with the latch release depressed, until the release is retained by the lock on the sleeve. Exploded view of this back plate is shown in figure 55-B.

(1) **DISASSEMBLY.**

(a) Remove the adjusting screw, buffer disks, and buffer plate as in

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Figure 55-B—Spade Grip Back Plate Assembly (Heavy Barrel Guns)—Exploded View

DISASSEMBLY AND ASSEMBLY

subparagraph a (1), above. Then, remove the latch and latch lock with their component springs by removing cotter pin from latch lockpin and pushing out both pins. The lock should be removed first.

(b) Remove the buffer tube sleeve by raising the sleeve spring, to disengage the stud from the buffer tube, and by sliding the sleeve to the rear. Then, remove the trigger and bolt latch release, together with their coil springs, by pushing out the trigger pin.

NOTE: An alternate design of buffer tube sleeve is without the sleeve spring and stud. This sleeve is split longitudinally and has a small projection formed on the inner surface for retaining the sleeve on the buffer tube. The sleeve is removed by forcing it to the rear to cam the projection out of the retaining groove in the buffer tube. This disengagement can be facilitated by spreading the split tube slightly with a screwdriver blade.

(2) ASSEMBLY.

(a) Assemble the latch and latch lock to the lower handle support in a similar manner to that employed when assembling to the lower filler piece described in subparagraph a (2), above.

NOTE: A new type of latch lock spring is in the form of a curved leaf spring, with an eye on one end and a hook on the other. This spring is assembled in the lock by hooking the hooked end under the pin end of the lock, so that the eye will face down and bear on the lower handle frame when assembled.

(b) Assemble the buffer plate, buffer disks and adjusting screw as described in subparagraph a (2), above.

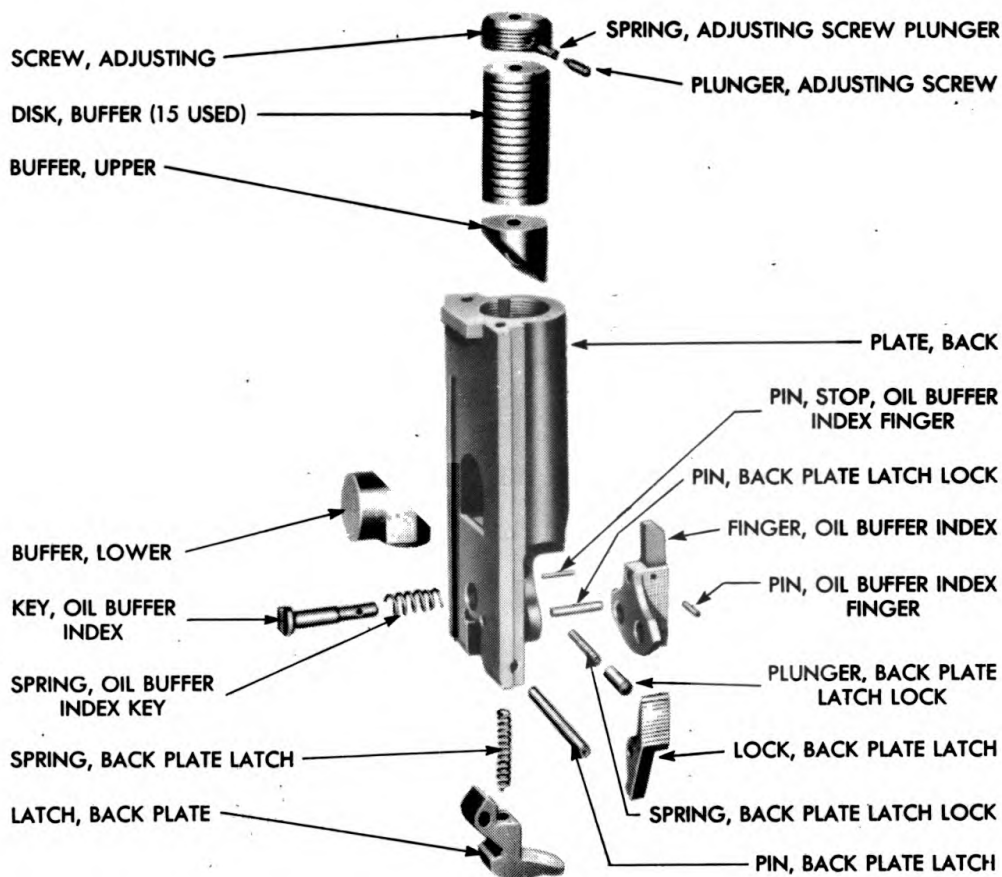
(c) Raise the positioning stud of the buffer tube sleeve spring by lifting the spring, and sliding the sleeve onto the buffer tube, lock-end first and knurled-end to rear, until the spring stud will snap into the retaining groove in the tube. The alternate design tube is similarly assembled by slightly expanding the split sleeve and sliding it on the buffer tube until the positioning projection engages as above.

(d) Place the trigger and bolt latch release in the opening at the top of the back plate with the trigger on the right of the bolt latch release, so that the thumb piece of the release lies between the ears of the trigger. Seat the trigger and bolt latch release spring (identical) in their seats in the parts and back plate, aline pin holes and push trigger pin through until flush. Be sure springs are securely seated at both ends.

e. Vertical Buffer Back Plate. This back plate was used extensively on fixed guns of all types prior to 1939.

(1) **DISASSEMBLY.** Remove the adjusting screw, using combination wrench, taking care not to lose the plunger and spring, and remove the buffer disks and upper buffer by turning the buffer upside down. If the

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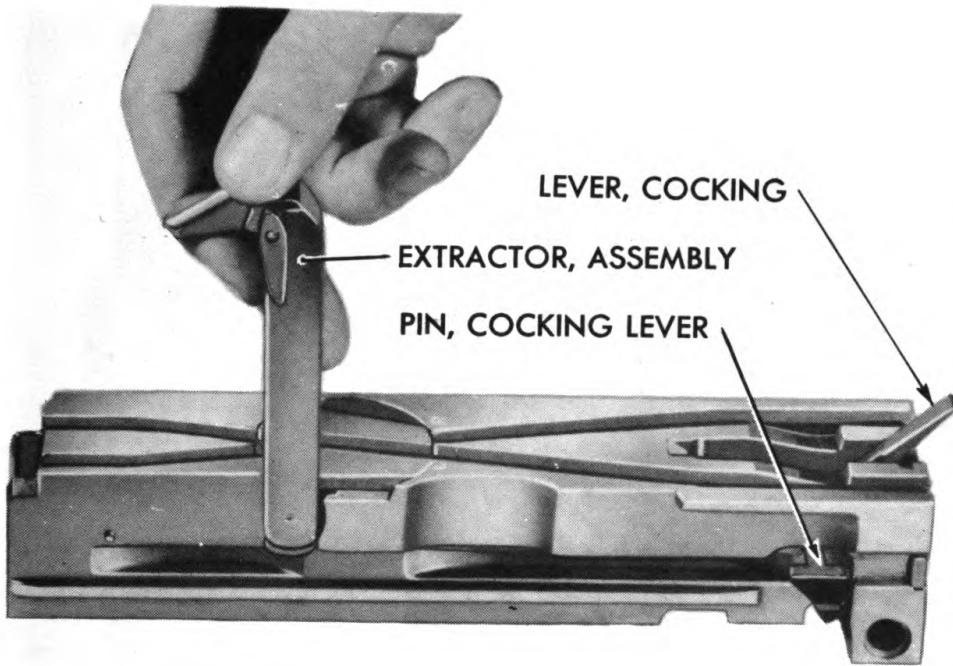
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Figure 56—Vertical Buffer Back Plate Assembly—Exploded View

buffer disks become wedged in the back plate, they may be removed by inserting a hooked wire through the hole in the disks (old style disks only). Grasp the projecting part of the lower buffer, and after lifting it slightly, remove it from the front of the back plate. Using a drift, remove the back plate latch by removing the pin, taking care not to lose the latch spring. Remove the latch lock by removing the pin, and take out the spring and plunger. The oil buffer index finger is removed by taking out the pin and removing the index finger key and spring. All parts of this assembly, in their relative position, are shown in figure 56.

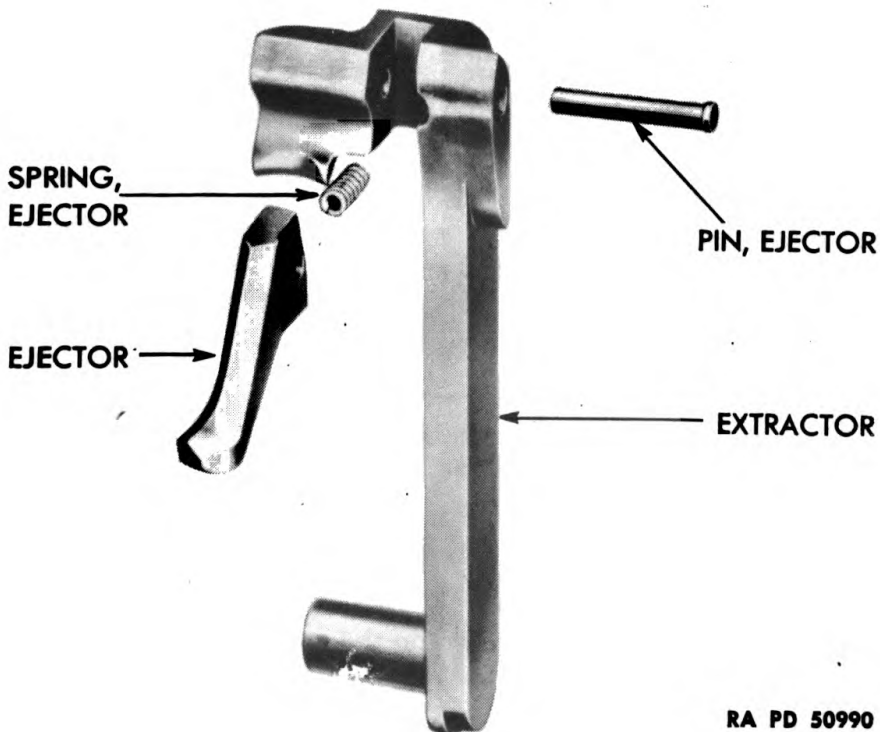
(2) **ASSEMBLY.** Place the index finger spring over the key, and insert the key through the front of the back plate with the beveled surface down. Depress the key to compress the spring, place the index finger over the key with the pointer up and insert the pin. Insert the latch spring in the back plate latch and attach the latch by inserting the pin. Insert the latch lock plunger and spring in the recess in the back plate, place

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Figure 57—Removing Extractor Assembly



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Figure 58—Extractor Assembly—Exploded View

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Figure 59—Disengaging Sear Stop Assembly

the latch lock in position and secure by inserting the pin. Insert the lower buffer with the beveled surface up, through the front of the back plate. Drop the upper buffer into the tube with the beveled surface down, and the long side to the rear. Insert the buffer disks in the tube, making sure they are seated properly, and start the adjusting screw. Insert the plunger and spring, and tighten the adjusting screw, using the combination wrench.

20. BOLT GROUP DISASSEMBLY AND ASSEMBLY.

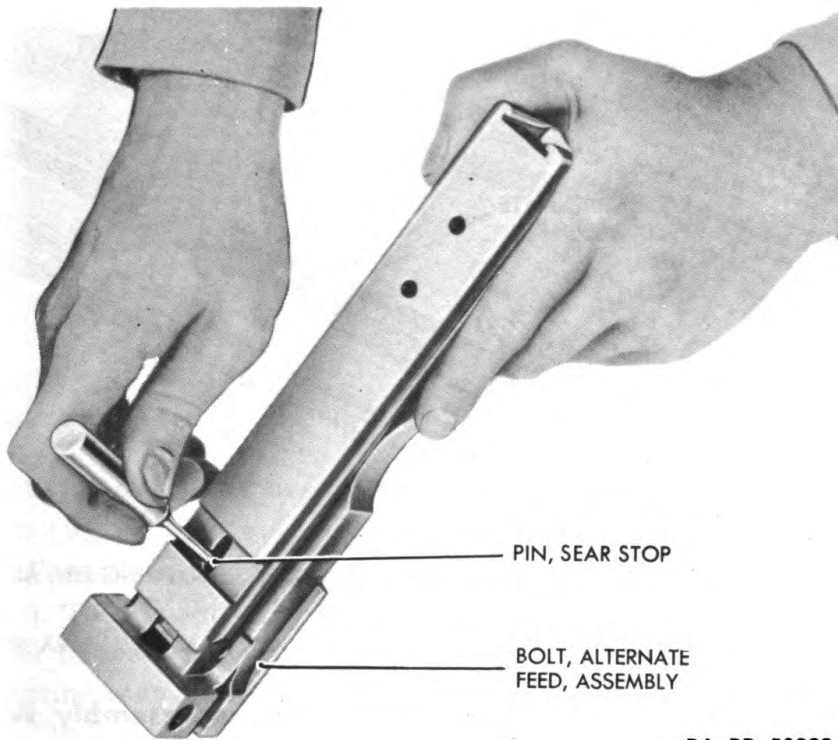
a. Disassembly.

(1) Remove the extractor assembly by rotating it upward and pulling out from the bolt (fig. 57). The extractor assembly may be disassembled, as shown in figure 58, by placing a drift against the conical depression in one end of the pin and driving out the pin. Lift out bolt switch and bolt switch stud.

CAUTION: Before pushing down on the sear protrusion to release the firing pin, swing the cocking lever rearward. If this is not done, injury to personnel may result.

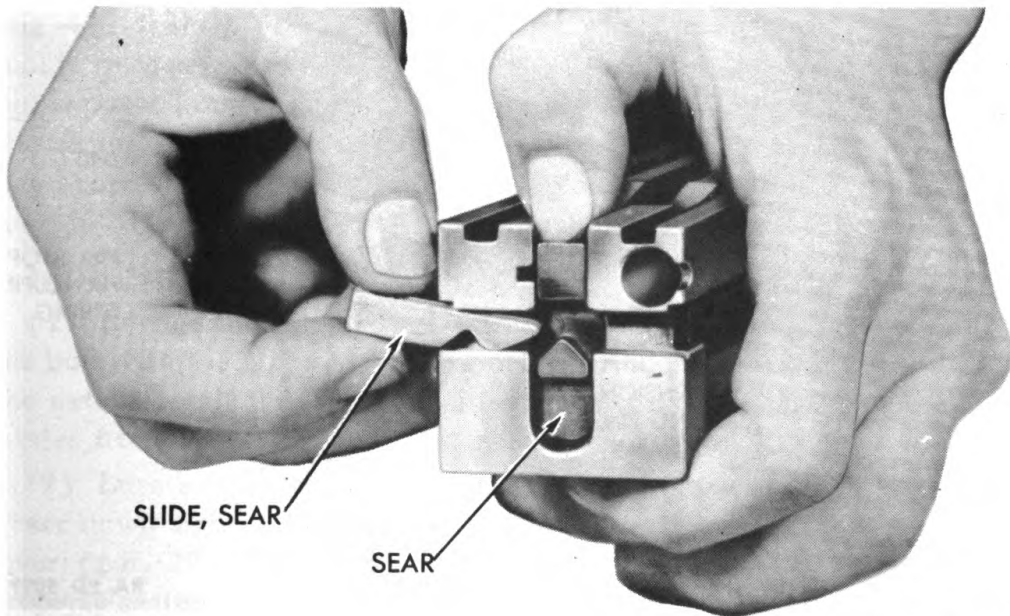
(2) Take out the cocking lever pin and cocking lever (fig. 57). With the thin end of the cocking lever, swing the sear stop out of its groove in

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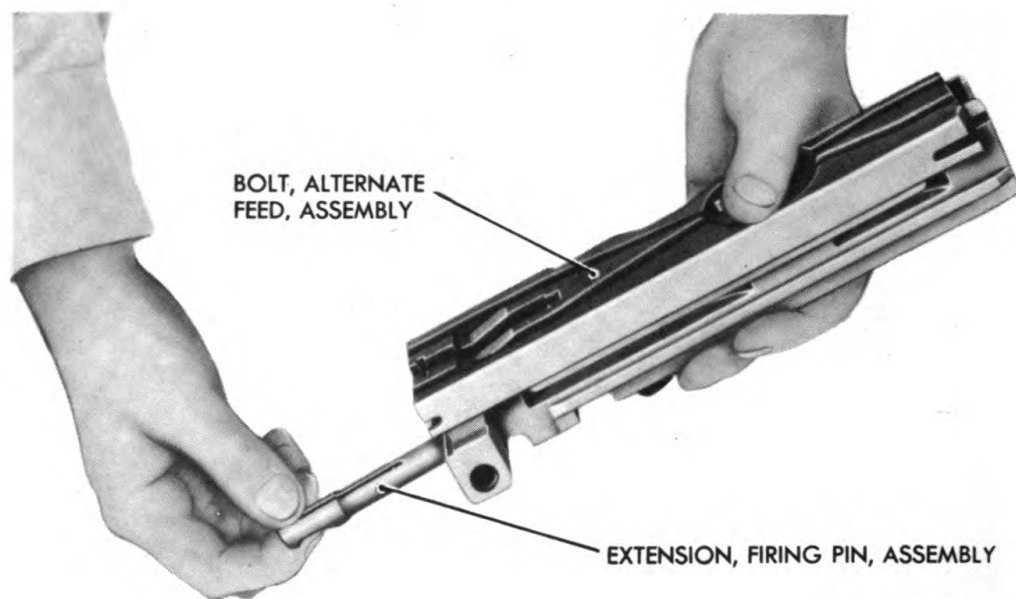
Figure 60—Pushing Out Sear Stop Assembly (Pin)



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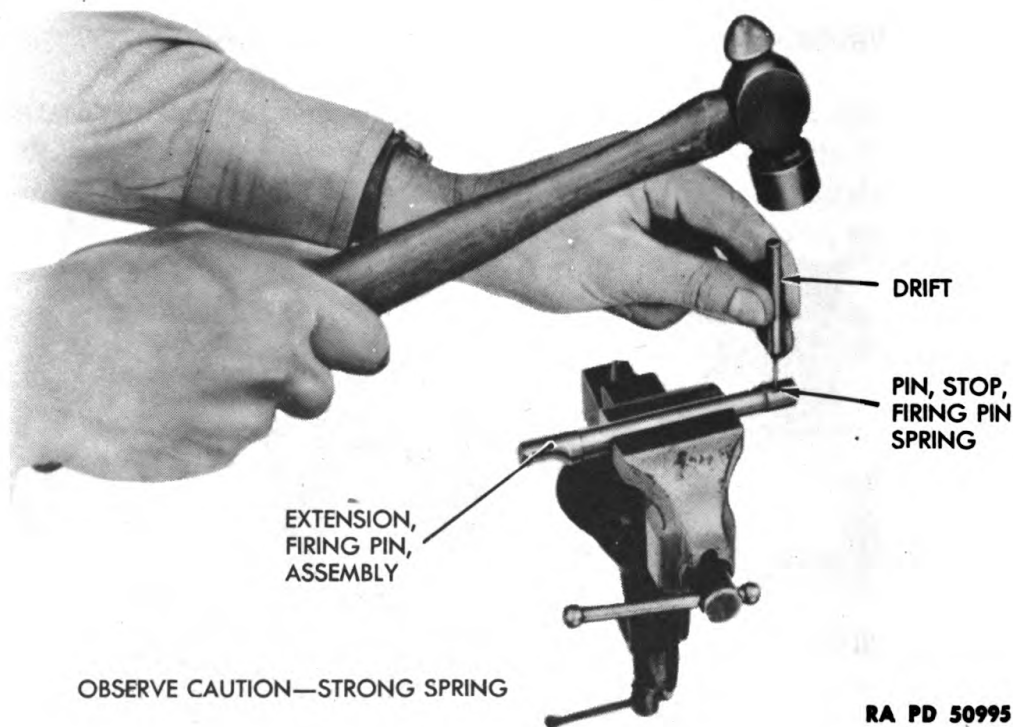
Figure 61—Removing Sear Slide

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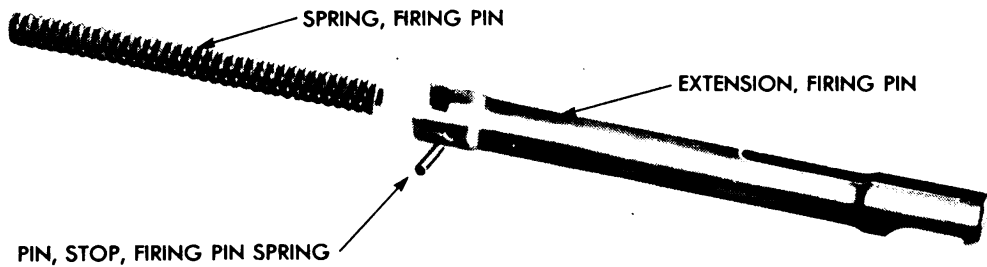
Figure 62—Removing Firing Pin Extension Assembly With Firing Pin Attached



RA PD 50995

Figure 63—Disassembling Firing Pin Extension Assembly

DISASSEMBLY AND ASSEMBLY



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Figure 64—Firing Pin Extension Assembly—Exploded View

the bolt (fig. 59). Turn over the bolt, and with a drift, push out the sear stop pin (fig. 60).

(3) Press down on the sear with the thumb and remove the sear slide (fig. 61). To prevent loss of the sear spring, insert thin end of the cocking lever between coils of the spring; then remove sear and sear spring. (The spring may be left thus attached to the cocking lever for ease in reassembly.)

(4) Elevate the front of the bolt and the firing pin extension and firing pin will drop out (fig. 62). The firing pin extension is not usually disassembled unless replacement of parts is necessary. If disassembly is necessary, the firing pin spring may be removed by removing the firing pin spring stop pin. If the firing pin spring disassembly tool is available (fig. 42), it should be used to disassemble and assemble the spring. The tool is pushed on over the extension to depress the spring while the stop pin is pushed out of or into the extension. The disassembled extension is shown in figure 64. An exploded view of the alternate feed bolt and related parts is shown in figure 65. An exploded view of the single feed bolt used in M1921 and M1921A1 Guns is shown in figure 66.

b. Assembly.

(1) Engage the firing pin and firing pin extension, and insert them in the bolt with the notch at the rear of the firing pin extension down. Push the extension all the way forward so that the tip of the firing pin protrudes from the face of the bolt.

(2) Locate the sear spring in position and insert the sear in its slot. Press down lightly on the sear, at the same time rocking the cocking lever (par. 20 a (3)) in both directions to make sure the spring is properly seated both in the recess in the bolt and the recess in the bottom of the sear. Press down on the sear and insert the sear slide. If the gun is to be fired by the trigger bar, the square end of the sear slide may be either to the right or to the left. If the gun is to be fired by a mechanism

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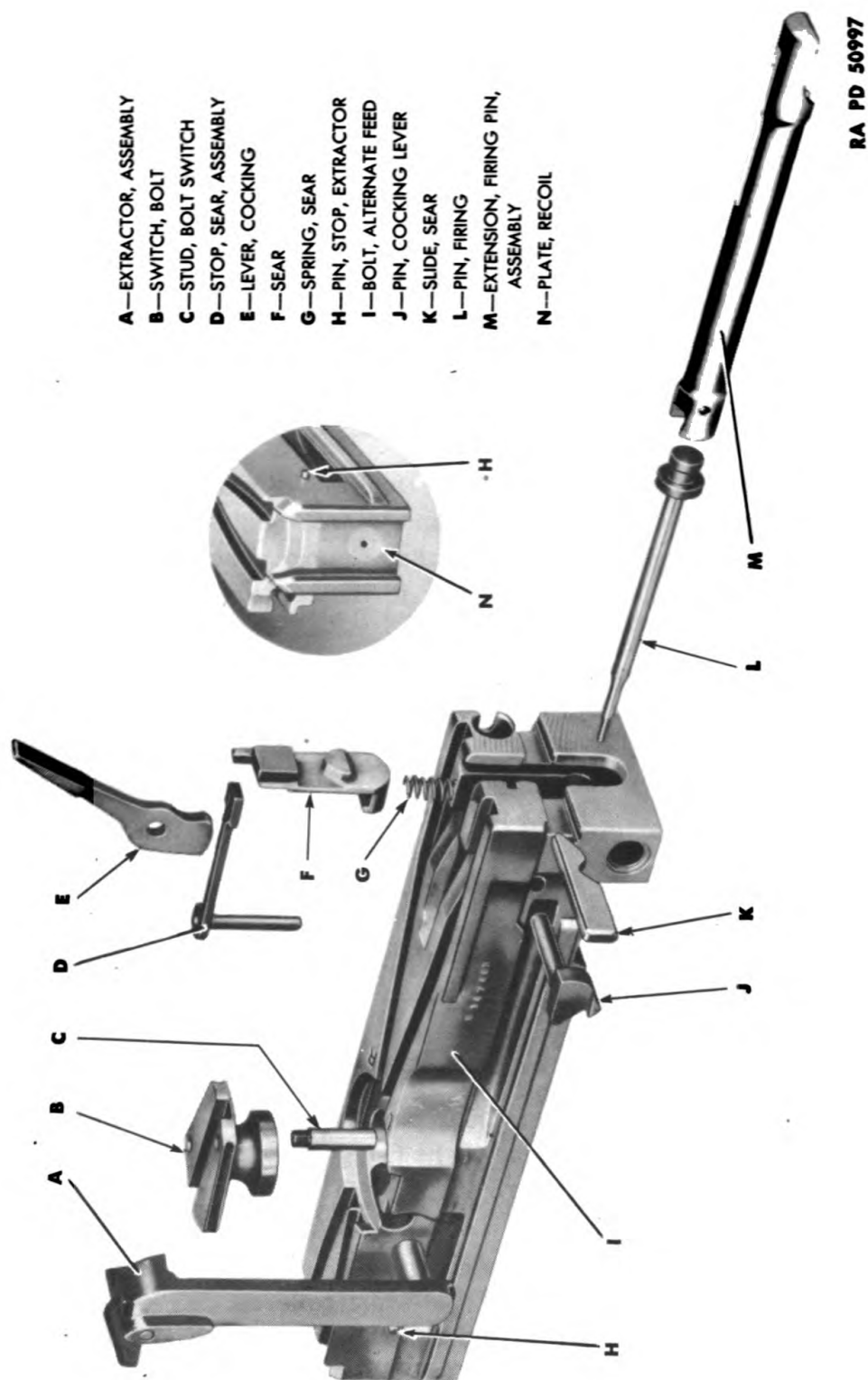
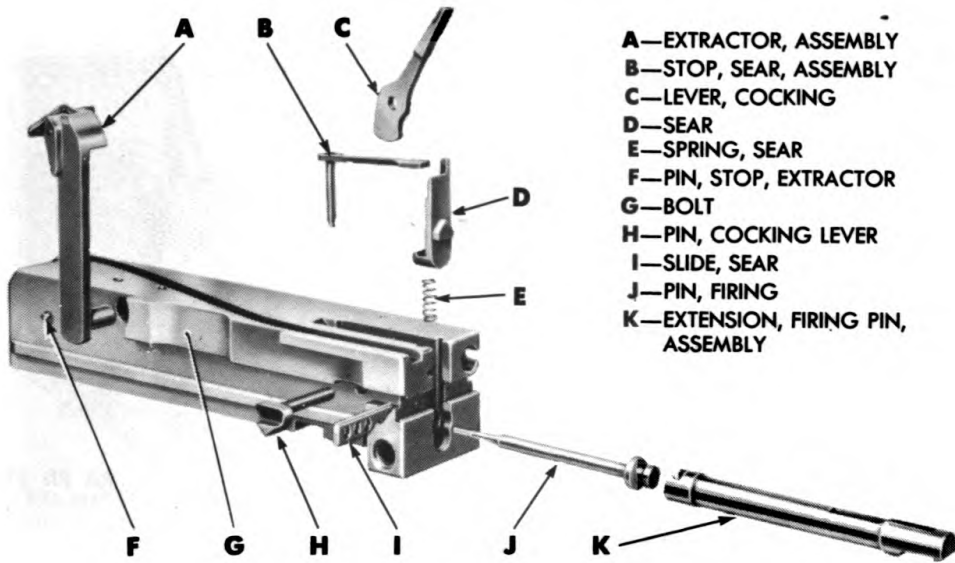


Figure 65—Alternate Feed Bolt Group—Exploded View

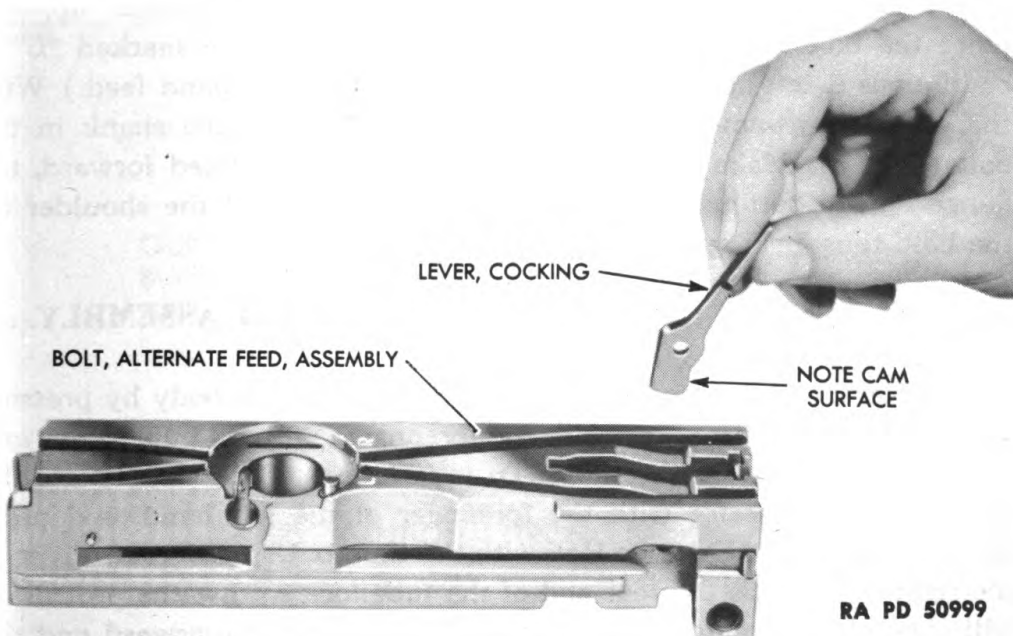
DISASSEMBLY AND ASSEMBLY



RA PD 50998

Figure 66—M1921 And M1921A1 Bolt Group—Exploded View

attached to the side plate, the square end of the slide must be on the side from which the weapon is to be fired. Insert the sear stop assembly in the bolt and push downward on the sear stop pin with the thin end of the cocking lever until it extends through the slot in the firing pin



RA PD 50999

Figure 67—Assembling Cocking Lever

ORDNANCE MAINTENANCE—BROWNING MACHINE GUN, CAL. .50,
ALL TYPES

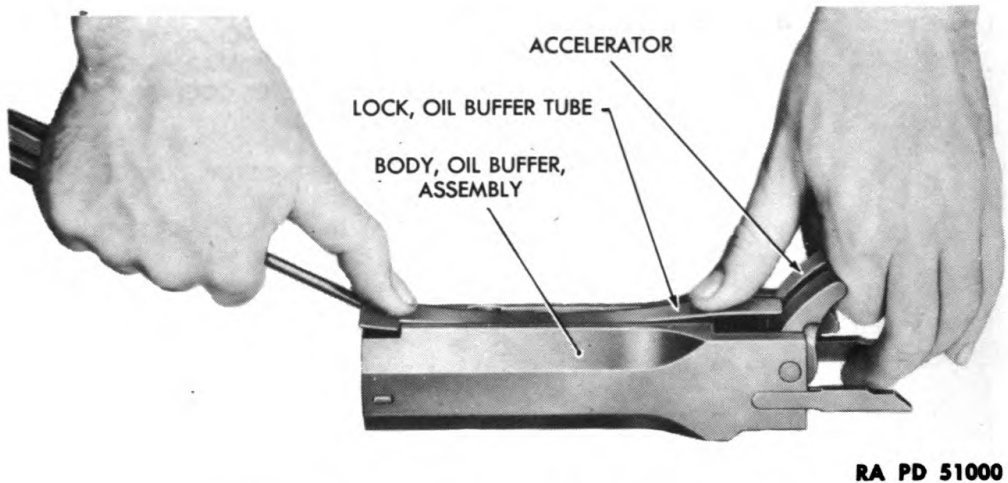


Figure 68—Removing Oil Buffer Tube Lock

extension. Then swing the sear stop into its groove in the left side of the recess.

(3) Insert the cocking lever in the slot of the bolt with its rounded cam surface to the rear (fig. 67) and insert the cocking lever pin from the left side. Push the cocking lever all the way forward, *return it to its rear position*, and press downward on the top of the sear. The click of the firing pin will be heard if the assembly is correct. *Again push the cocking lever all the way forward for proper preparation of the bolt before assembly in the gun.*

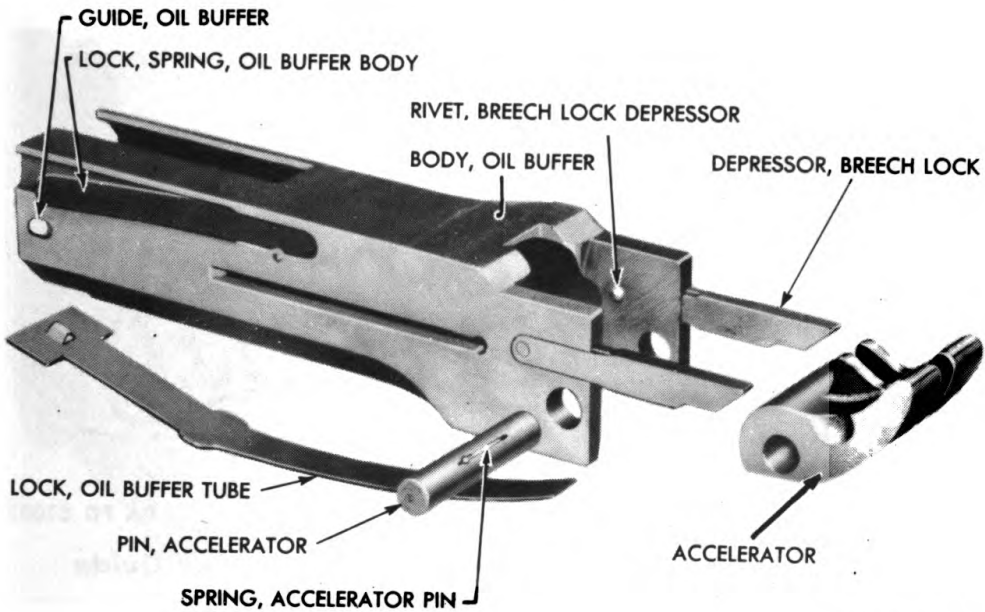
(4) Insert the bolt switch stud, with the small diameter up, and place the bolt switch over the stud so that the groove marked "L" is continuous if left-hand feed is desired. ("R" for right-hand feed.) With the extractor assembly in a vertical position, insert the shank in the bolt (fig. 57). Make sure that as the extractor is rotated forward, the flange on the bottom of the extractor engages behind the shoulder on the bolt, thus locking it in position.

21. OIL BUFFER GROUP DISASSEMBLY AND ASSEMBLY.

a. Disassembly.

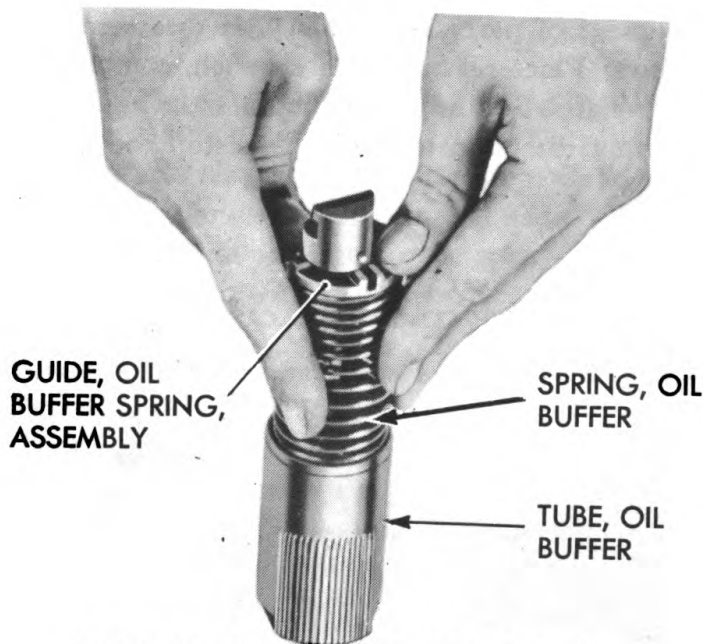
(1) Remove oil buffer assembly from the oil buffer body by pressing on the end of the piston rod with the forefinger. Turn oil buffer over and place upside down on the table. To remove the tube lock, elevate the tips of the accelerator with the forefinger of the left hand, and press down on the end of the tube lock with the thumb. Using a screwdriver in the right hand, raise the rear end of the tube lock so that the protrusion will clear the oil buffer body. Rotate the accelerator rearward and the tube lock will be pushed out of its recess. The left thumb will keep the tube lock from springing out suddenly (fig. 68). With a drift, push out

DISASSEMBLY AND ASSEMBLY



RA PD 51001

Figure 69—Oil Buffer Body Group—Exploded View

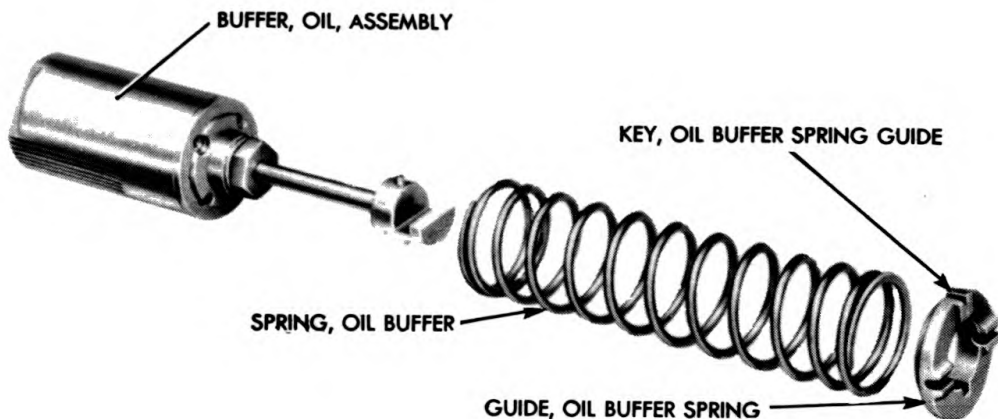


OBSERVE CAUTION—STRONG SPRING

RA PD 51002

Figure 70—Removing Oil Buffer Spring

ORDNANCE MAINTENANCE—BROWNING MACHINE GUN, CAL. .50,
ALL TYPES

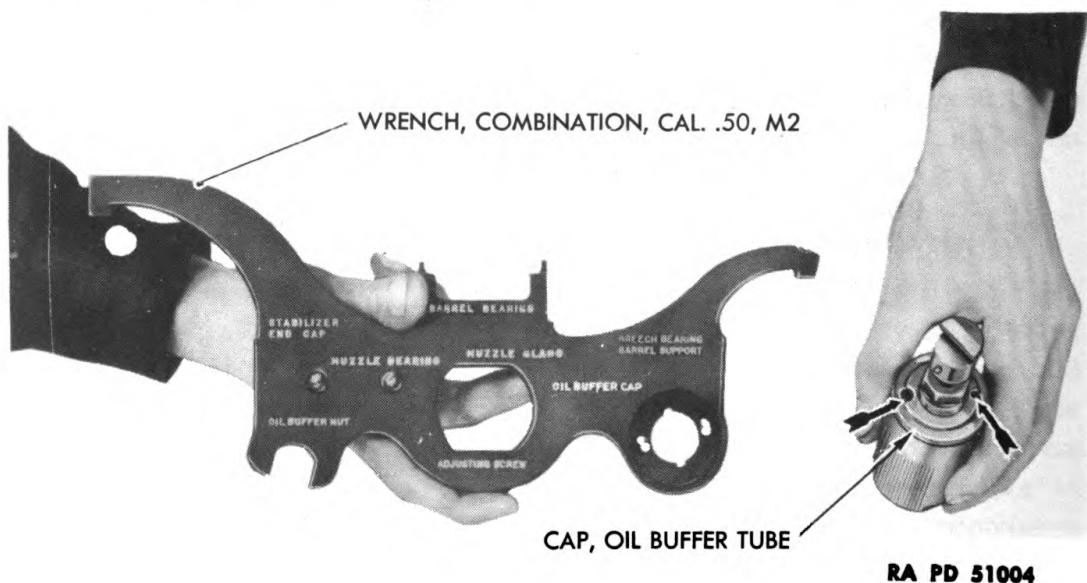


RA PD 51003

Figure 71—Oil Buffer Assembly With Spring And Guide

the accelerator pin and remove the accelerator. In most cases the oil buffer body spring lock is staked and not removed in disassembly. Exploded view of the oil buffer body assembly and related parts is shown in figure 69.

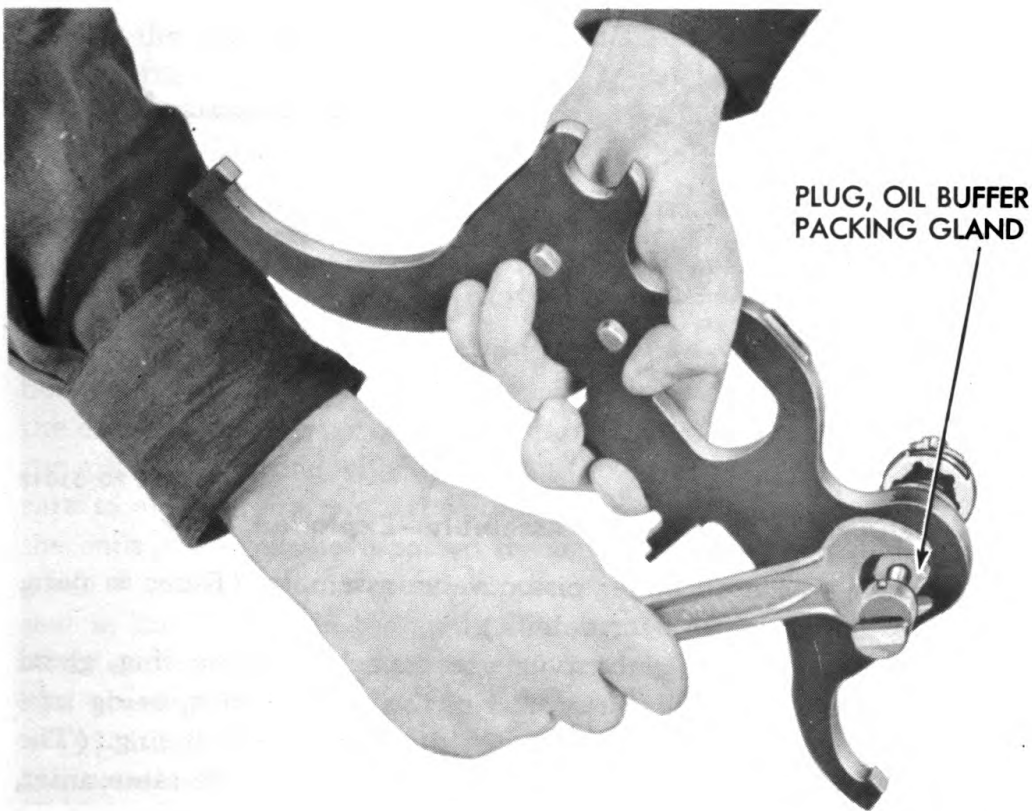
(2) The oil buffer assembly is not usually disassembled unless repairs or replacement of parts is necessary. If disassembly is necessary, proceed as follows: Place oil buffer on a bench, compress the oil buffer spring as shown in figure 70, and rotate oil buffer spring and guide through 90 degrees in either direction to align the piston rod pin with the slots



RA PD 51004

Figure 72—Removing Oil Buffer Tube Cap

DISASSEMBLY AND ASSEMBLY



RA PD 51005

Figure 73—Removing Oil Buffer Packing Gland Plug

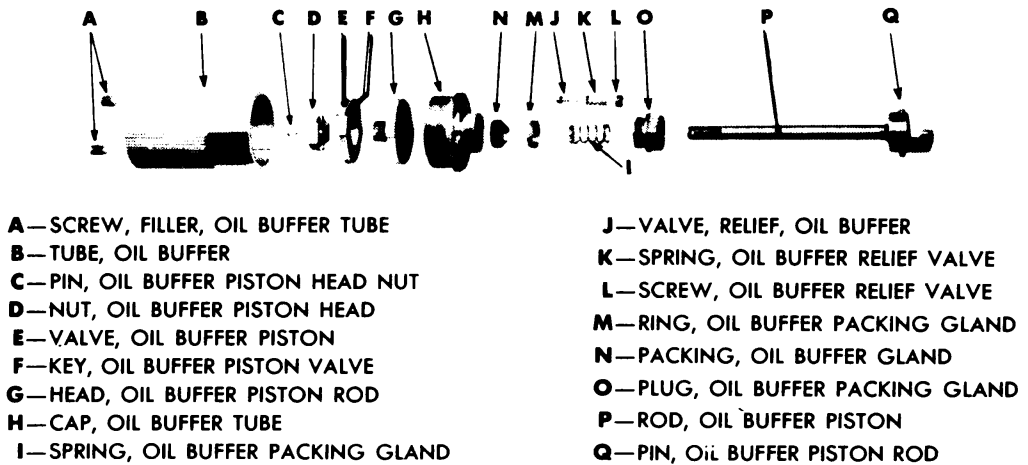
in the spring guide. Exercise care to avoid injury. Release pressure slowly and remove the spring guide and spring (fig. 71).

NOTE: If a vise is available, grasp the spring guide in the vise, and the operations outlined above can be performed with greater ease and safety.

(3) Remove the filler screws, *using a screwdriver which fits the slots exactly*, and drain out the oil. Remove the oil buffer tube cap with the projection of the combination wrench marked "OIL BUFFER CAP" (fig. 72). After removal of the cap, the piston rod and related parts may be withdrawn from the tube. Take out the piston head nut pin and unscrew the piston head nut. Remove the piston valve assembly and unscrew the piston rod head. Unscrew the gland plug from the cap (fig. 73). The oil buffer packing, packing gland ring and packing gland spring can then be taken out. Exploded view of the oil buffer assembly is shown in figure 74.

b. Assembly. Present manufacture of heavy barrel guns is omitting the oil buffer gland packing, packing gland ring, packing gland spring, relief valve, relief valve spring, relief valve screw, tube filler screws, and

ORDNANCE MAINTENANCE—BROWNING MACHINE GUN, CAL. .50,
ALL TYPES



RA PD 51042

Figure 74—Oil Buffer Assembly—Exploded View

oil in addition to the oil buffer piston valve assembly. (Refer to paragraph 63 g and figure 112 for details.)

(1) Place the packing gland plug, gland packing, gland ring, gland spring and tube cap on the piston rod in the order named, being sure the bevel on the packing (conical type) fits into the gland ring. (The new (cylindrical type) packing A153162 is assembled in the same order, but with a washer A153161 and spring A153163 in place of the gland ring and spring used with the old conical type packing.) Screw gland plug into tube cap and tighten, using combination wrench. Then screw piston rod head on rod, with the shoulder away from the cap, until the end of the threaded shoulder is flush with the end of the rod. The distance from the forward face of the piston rod head to the forward face of the shank engaging notch on the end of the piston rod should not be less than $3.970 + 0.014$ inches. Place valve assembly on the shoulder of the rod head with the flat face toward the rod head. Screw the piston head nut on the rod head allowing a clearance of approximately 0.050 inch between the rod head and valve assembly. (A tube lock or a new dime may be used as a thickness gage). Adjust, if necessary, to provide this clearance, aline the slots in the nut and shoulder of the rod head with the hole in the rod, insert the piston head nut pin, and bend both ends of the pin.

(2) Insert the rod and its assembled parts into the oil buffer tube with the valve keys riding in the grooves in the tube wall. Tighten the tube cap securely with the combination wrench. In order for the oil buffer spring to function properly in the gun during the complete recoil stroke, the assembled length of the oil buffer assembly must be within the proper dimensions. The distance from the rear of the oil buffer tube to the extreme forward face of the oil buffer piston rod (over-all length)

DISASSEMBLY AND ASSEMBLY

must be within 6.525 inches and 6.553 inches. Turn the oil buffer assembly so that the openings for the filler screws are on top. Pull the piston rod out of tube as far as possible. With OIL, recoil, light, flowing freely from the spout of an oilcan, insert the spout in one of the filler holes and fill until the oil flows out of the other filler hole. Insert filler screws and tighten securely with a screwdriver which fits the slots exactly.

NOTE: It is necessary that the over-all length of the buffer should be between the above dimensions for proper functioning of the gun, as explained in paragraph 63 h.

(3) To assemble the spring to the oil buffer assembly, place the oil buffer on bench with the piston rod fully extended. Place the spring on the cap, and the flat surface of the spring guide on top of the spring with the guide key in line with the pin on the cutout side of the rod. Taking care to avoid injury, press the guide down over the rod (fig. 70). When the ends of the pin have passed through the slots in the guide, give the guide a quarter turn in counterclockwise direction and allow the pin to seat in the recesses in the guide. If a vise is available, these operations may be performed more conveniently and safely by fastening the guide in a vise and assembling the parts as outlined above.

(4) Insert the accelerator pin through the holes in the oil buffer body and accelerator. Turn the oil buffer body upside down; lay the tube lock on the body with the bowed side away from the buffer body. Depress the tube lock so as to force the projecting ears into the circular recess in the groove in the oil buffer body. Holding the tube lock down in this position, grasp the projecting end of the lock and slide it toward the accelerator, lifting the projecting end slightly so that the lug on the tube lock clears the oil buffer body. The lug should engage in the hole in the bottom of the oil buffer body.

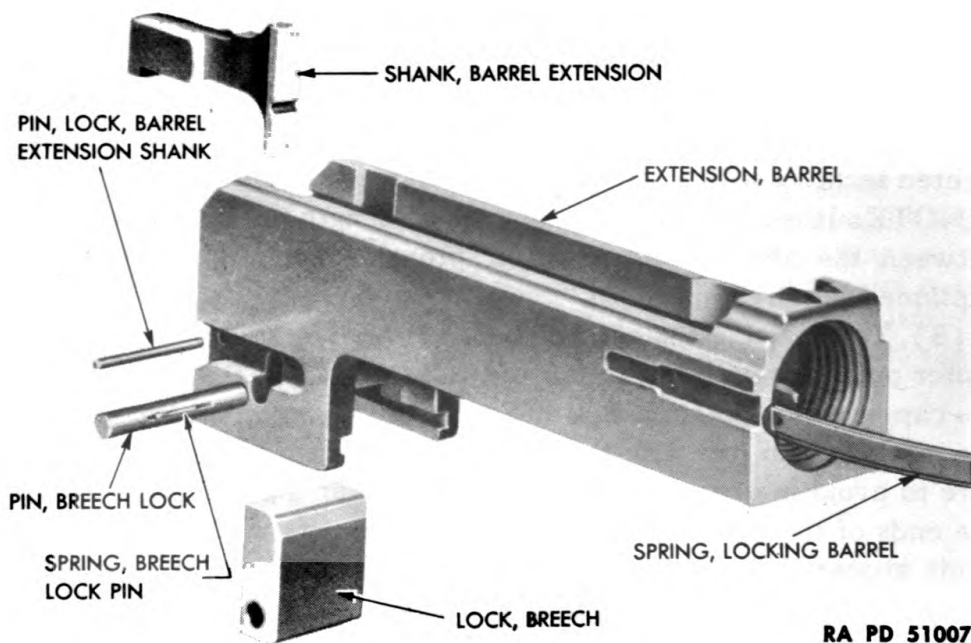
(5) Replace the spring lock in the side of the oil buffer body and insert the oil buffer in the body with the guide key engaging in the slot in the side of the buffer body.

22. BARREL EXTENSION GROUP DISASSEMBLY AND ASSEMBLY.

a. Disassembly. The barrel locking spring is pushed forward out of its seat. The breech lock is removed by pushing out the breech lock pin with a drift. Exploded view of the barrel extension assembly and related parts are shown in figure 75.

b. Assembly. The breech lock is assembled into the barrel extension with the bevel faces to the front and the double bevel on the top. Insert the pin, taking care that both ends of the pin are flush with the sides of the barrel extension. The locking spring is replaced in its seat with the protrusion inside and the barrel is screwed into the barrel extension. Headspace is adjusted when the weapon is fully assembled.

**ORDNANCE MAINTENANCE—BROWNING MACHINE GUN, CAL. .50,
ALL TYPES**

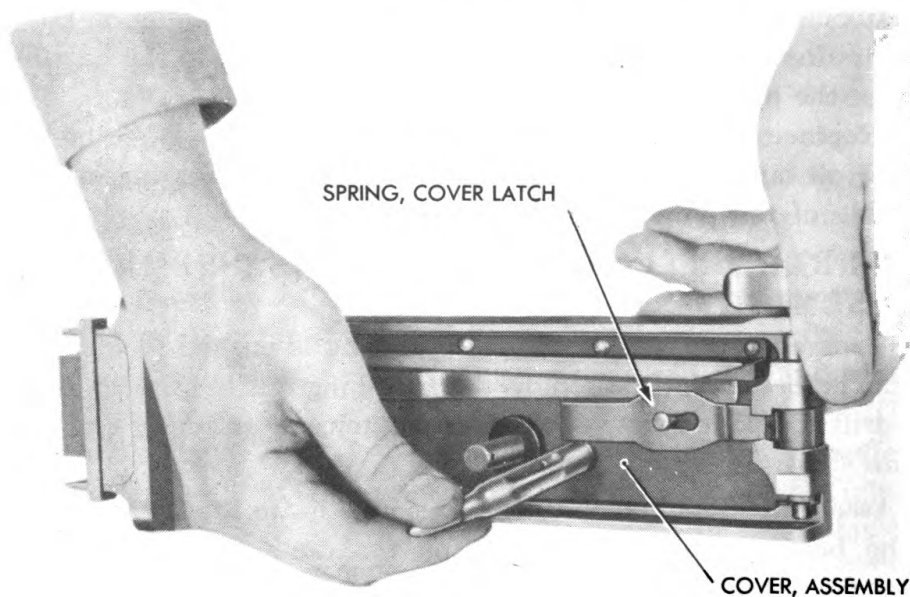


RA PD 51007

Figure 75—Barrel Extension Group—Exploded View

Headspace adjustment is discussed in paragraph 31.

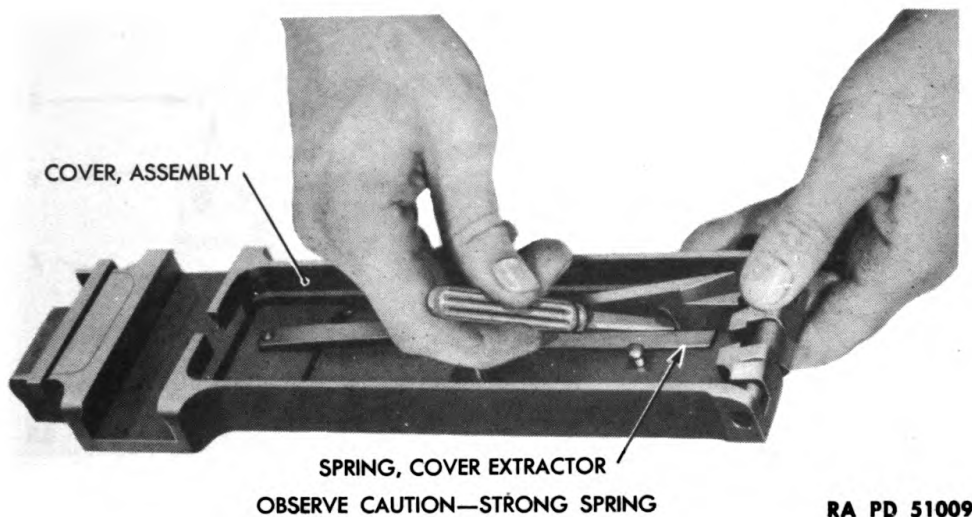
NOTE: Check to see that the rear end of the barrel extends slightly into the barrel extension when screwed all the way in. If it does not, the



RA PD 51008

Figure 76—Removing Cover Latch Spring

DISASSEMBLY AND ASSEMBLY



RA PD 51009

Figure 77—Removing Cover Extractor Spring

barrel dimensions are faulty and a true headspace adjustment cannot be made.

23. COVER GROUP DISASSEMBLY AND ASSEMBLY.

a. Disassembly.

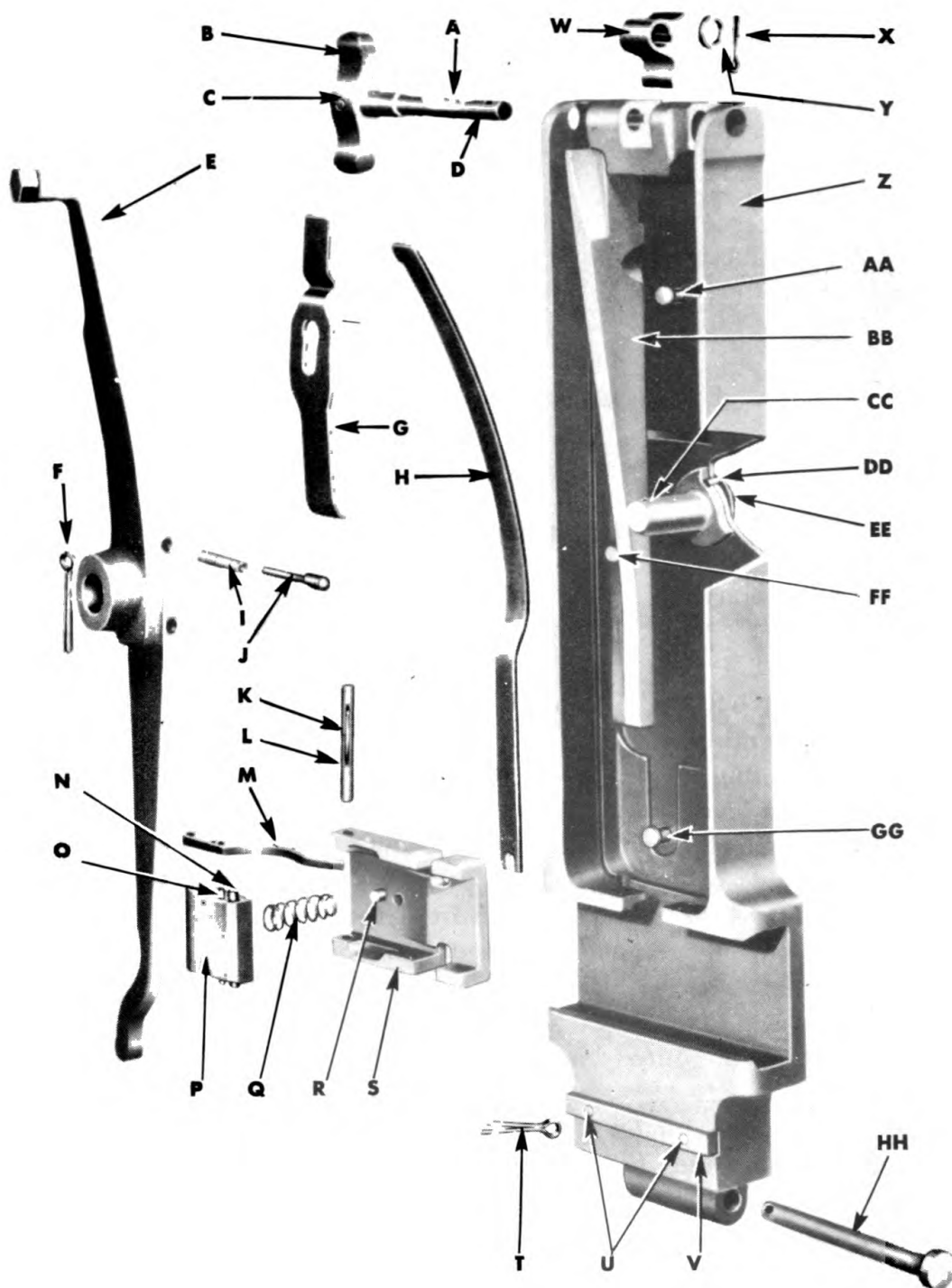
(1) With the cover opened, remove the belt feed lever cotter pin and belt feed lever, taking care that the spring and plunger do not fly out. The belt feed lever plunger and spring are then removed from the hole in the side of the lever.

(2) Remove the belt feed slide from the cover. Push out the belt feed pawl pin and remove belt feed pawl, pawl spring, and belt feed pawl arm. Keep spring from flying out while doing this.

(3) Lift end of cover latch spring out of the groove in the cover (fig. 76) and turn this lifted end slightly so that it rests on the extractor spring.

(4) The cover latch spring is then compressed by firm pressure of the thumb, and the spring is slid away from the latch and removed. Pry the end of the extractor spring out of the recess in the cover extractor cam (fig. 77) and disengage from the holding stud at the opposite end. Treat this spring with caution since it can spring out and cause injuries. The latch is taken out by removing the shaft cotter pin and washer, *turning the latch shaft to the latched position*, and withdrawing the shaft from the cover. Exploded view of the cover and related parts for M2 Guns is shown in figure 78. Exploded view of parts of cover group of M1921 and M1921A1 Guns is shown in figure 79.

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ALL TYPES



RA PD 51010

Figure 78—M2 Cover Group—Exploded View

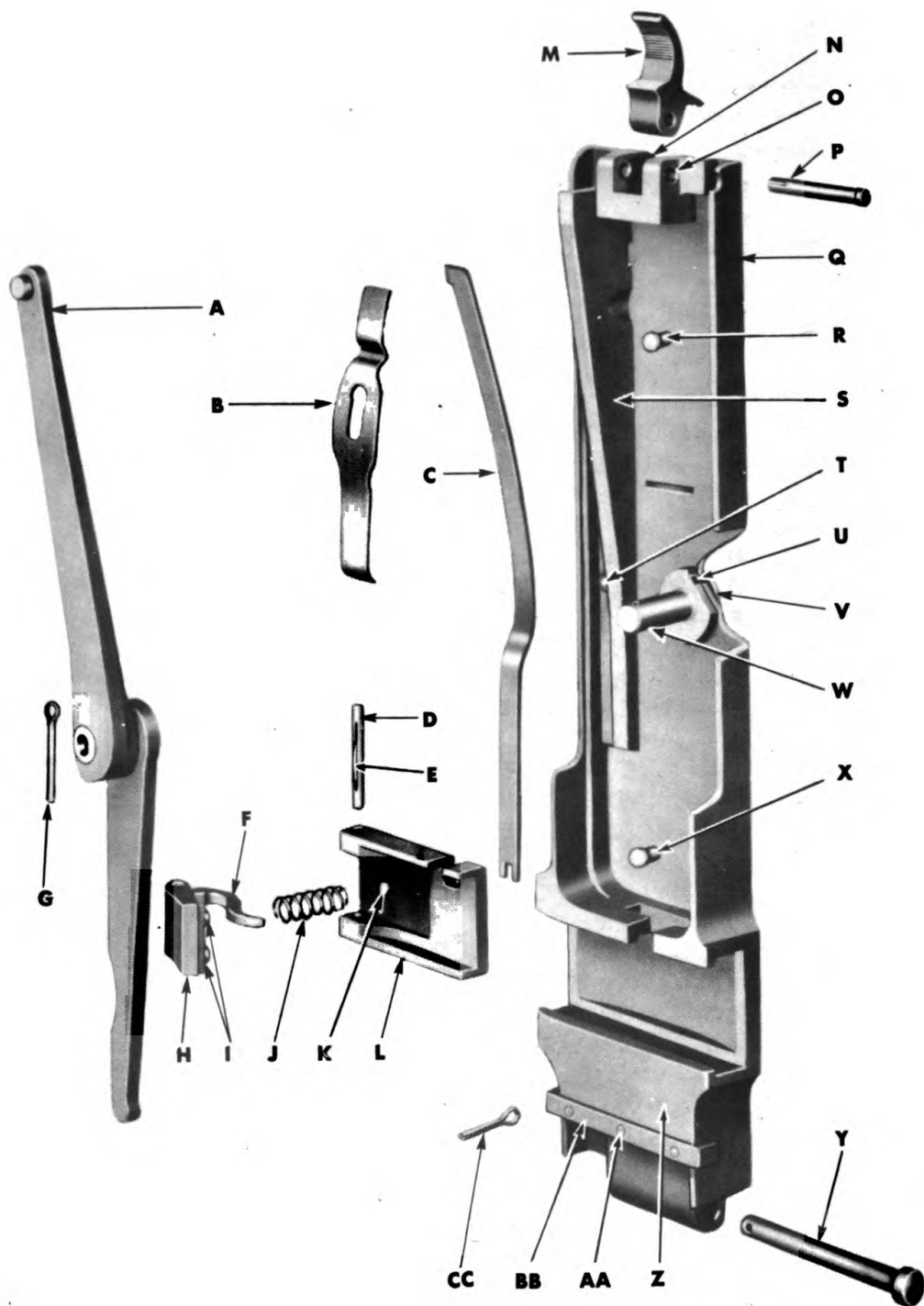
DISASSEMBLY AND ASSEMBLY

A — KEY, COVER LATCH SHAFT
B — LEVER, COVER LATCH SHAFT
C — PIN, COVER LATCH SHAFT LEVER
D — SHAFT, COVER LATCH
E — LEVER, FEED, BELT
F — PIN, COTTER, SPLIT, S., BFAX1CE
G — SPRING, COVER LATCH
H — SPRING, COVER EXTRACTOR
I — SPRING, BELT FEED LEVER PLUNGER
J — PLUNGER, BELT FEED LEVER
K — SPRING, BELT FEED PAWL PIN
L — PIN, BELT FEED PAWL
M — ARM, BELT FEED PAWL
N — PIN, BELT FEED PAWL ARM
O — PIN, LOCATING, BELT FEED PAWL ARM
P — PAWL, FEED, BELT
Q — SPRING, BELT FEED PAWL
R — STUD, BELT FEED PAWL SPRING
S — SLIDE, FEED, BELT
T — PIN, COTTER, SPLIT, S., BFAX1DF
U — RIVET, COVER BRACKET
V — BRACKET
W — LATCH, COVER
X — PIN, COTTER, SPLIT, S., BFAX1BB
Y — WASHER, COVER LATCH SHAFT
Z — COVER
AA — STUD, COVER LATCH SPRING
BB — CAM, EXTRACTOR, COVER
CC — STUD, PIVOT, BELT FEED LEVER
DD — PIN, BELT FEED LEVER PIVOT STUD
EE — WASHER, BELT FEED LEVER PIVOT STUD
FF — RIVET, COVER EXTRACTOR CAM
GG — STUD, COVER EXTRACTOR SPRING
HH — PIN, COVER

RA PD 51010A

Nomenclature For Figure 78—M2 Cover Group—Exploded View

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ALL TYPES



RA PD 51011

Figure 79—M1921 And M1921A1 Cover Group—Exploded View

DISASSEMBLY AND ASSEMBLY

A — LEVER, FEED, BELT
B — SPRING, COVER LATCH
C — SPRING, COVER EXTRACTOR
D — PIN, BELT FEED PAWL
E — SPRING, BELT FEED PAWL PIN
F — ARM, BELT FEED PAWL
G — PIN, COTTER, SPLIT, S., BFAX1CE
H — PAWL, FEED, BELT
I — RIVET, BELT FEED PAWL ARM (2)
J — SPRING, BELT FEED PAWL
K — STUD, BELT FEED PAWL SPRING
L — SLIDE, FEED, BELT
M — LATCH, COVER
N — BRACKET, COVER LATCH
O — RIVET, COVER LATCH BRACKET (2)
P — PIN, COVER LATCH
Q — COVER
R — STUD, COVER LATCH SPRING
S — CAM, COVER EXTRACTOR
T — RIVET, COVER EXTRACTOR CAM (3)
U — PIN, BELT FEED LEVER PIVOT STUD
V — WASHER, BELT FEED LEVER PIVOT STUD
W — STUD, PIVOT, BELT FEED LEVER
X — STUD, COVER EXTRACTOR SPRING
Y — PIN, COVER
Z — PLATE, COVER FILLER PIECE
AA — RIVET, COVER FILLER PIECE, SHORT (3)
BB — BRACKET, COVER FILLER PIECE
CC — PIN, COTTER, SPLIT, S., BFAX1DF

RA PD 51011A

Nomenclature For Figure 79—M1921 And M1921A1 Cover Group —Exploded View

**ORDNANCE MAINTENANCE—BROWNING MACHINE GUN, CAL. .50,
ALL TYPES****b. Assembly.**

(1) The latch is assembled to the cover by placing the latch between the pin bosses on the underside of the cover with the keyway toward the top of the cover and with the projecting wing of the latch against the underside of the cover. The shaft can be installed from either side, but if a retracting slide is used, the shaft lever must be on the opposite side from the slide to provide hand clearance. Insert the latch shaft assembly with the key on the shaft toward the top of the cover. Place washer on the shaft and install cotter pin. This should be inserted with the head toward the hinged end of the cover and the ends must be bent sharply to avoid interference when latching down the cover.

(2) Install the extractor cover spring by hooking the slotted end under the extractor cover spring stud, with the curved end away from the cover. Hold the spring firmly against the stud, press the curved end until it rests on the cover and then slide the projection of the spring into the recess in the cover extractor cam. Place the cover latch spring inside the cover with the bent end against the cover and the enlarged hole meshing with the latch spring stud. Depress the spring and, at the same time, slide the spring toward the latch. Make sure that the latch end of the spring rides up over the projecting wing of the latch. Snap the bent end of the spring into the groove in the cover.

(3) When the belt feed slide is assembled for either right- or left-hand feed, the belt feed pawl arm must be placed over the belt feed pawl pin and locating pin so that the arm will be toward the rear when the cover is closed. The pawl and pawl arm, properly assembled, are placed in the belt feed slide with the spring held by the spring stud and recess in the pawl. The spring is depressed to aline the holes and the pin inserted. The belt feed slide is placed in its way or groove in the cover with the pawl end of the slide toward the side from which the gun is to be fed. Correct assembly of parts for both right- and left-hand feed is shown in figure 80.

(4) Insert the belt feed lever plunger and spring in the hole in the belt feed lever toward the latch end for left-hand feed, and in the hole toward the hinge end for right-hand feed. Aline the notch in the belt feed slide with the slot in the cover. Place the belt feed lever, with the shoulder up, over the pivot stud and, after depressing the lever plunger and spring, push the lever completely down on the stud so that the toe of the lever can work to and fro in the slot in the cover. Replace the belt feed lever cotter pin.

24. CASING GROUP DISASSEMBLY AND ASSEMBLY.

NOTE: The casing group includes the receiver group, together with

DISASSEMBLY AND ASSEMBLY

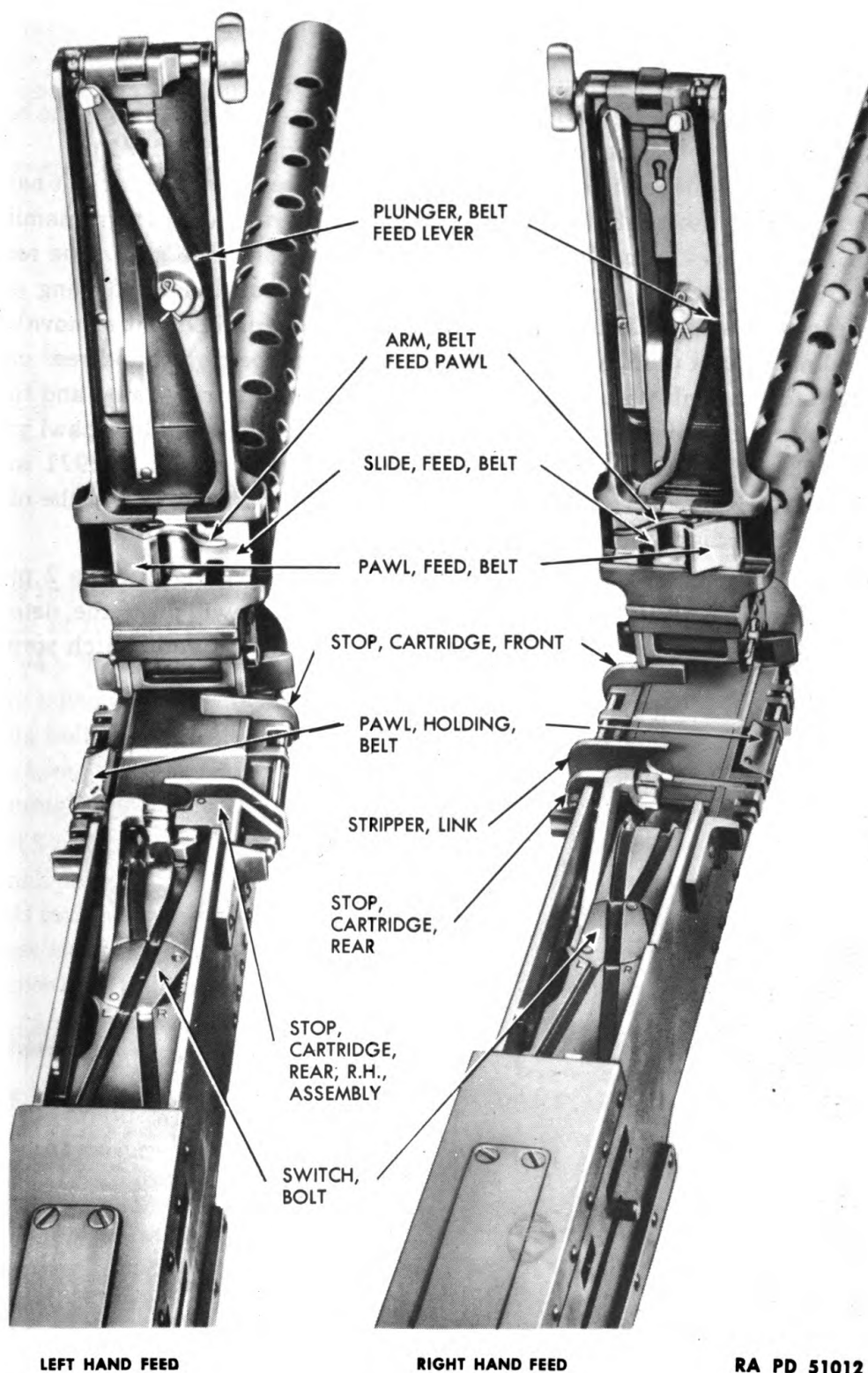


Figure 80—Position Of Parts For Right- And Left-Hand Feed

ORDNANCE MAINTENANCE—BROWNING MACHINE GUN, CAL. .50, ALL TYPES

the barrel jacket, water jacket, or barrel support groups, which are attached to it to comprise the model gun in question.

a. Disassembly.

(1) Remove the belt holding pawl and spring by withdrawing the belt holding pawl pin, being careful not to lose the spring (fig. 81).

(2) If the gun has been set up for left-hand feed and a rear right-hand cartridge stop assembly is used, it is detached by removing the remaining belt holding pawl pin. This also frees the front cartridge stop. The rear, right-hand cartridge stop assembly may be dismantled by driving out the pin with a drift. This will free the alining pawl and permit removal of the alining pawl plunger and spring (fig. 82). If the right-hand rear cartridge stop assembly is not used, the rear and front cartridge stop and link stripper are removed by taking out the remaining belt holding pawl pin.

NOTE: The front cartridge stop and link stripper of M1921 and M1921A1 Guns are riveted in place. Details of these parts and the old-style belt holding pawl are shown in fig. 83.

(3) The trunnion block cover is removed by driving out the 2 pins with a small drift. To remove the cover detent pawl, push the detent pawl forward and take out the cotter pin. The switch and switch spring

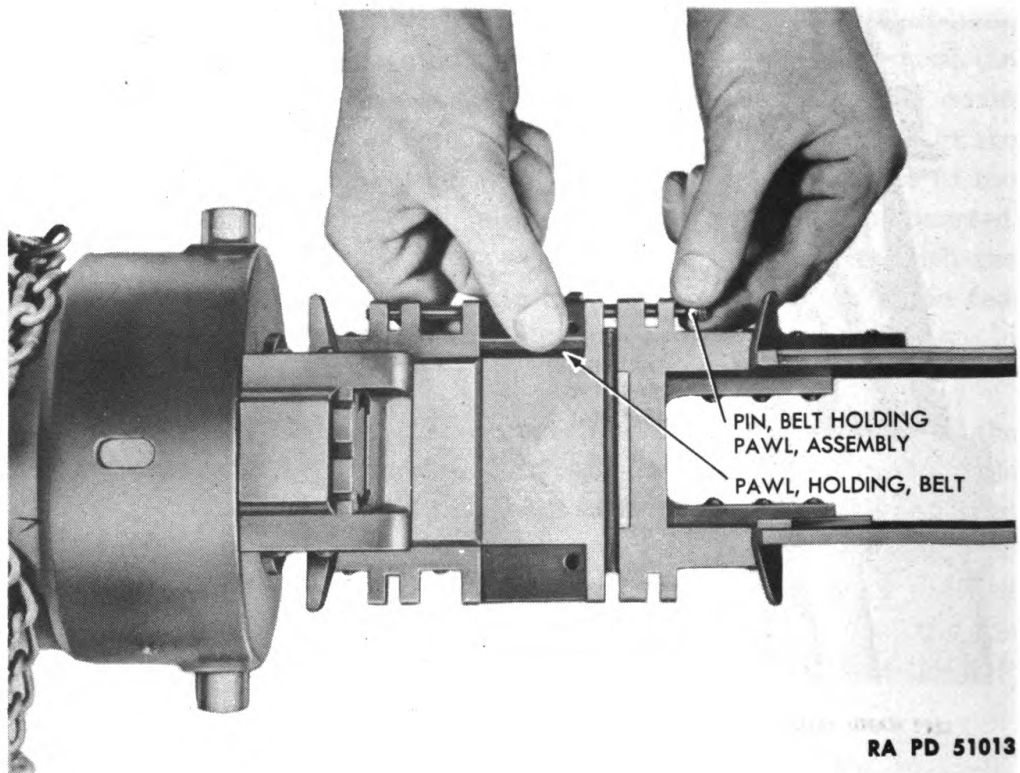
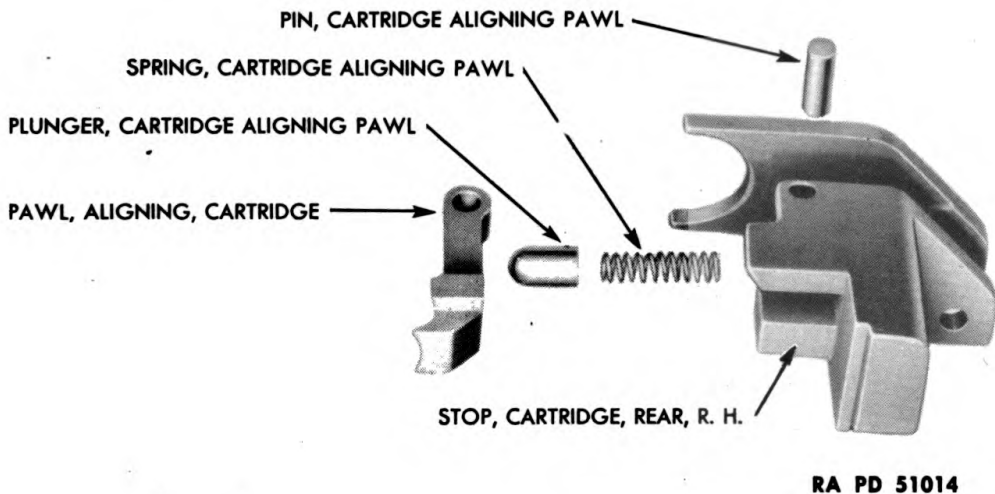


Figure 81—Removing Belt Holding Pawl

DISASSEMBLY AND ASSEMBLY

**Figure 82—Right-Hand Rear Cartridge Stop Assembly—
Exploded View**

are removed by pulling the cotter pin and taking off the nut on the outside of the left side plate (fig. 84).

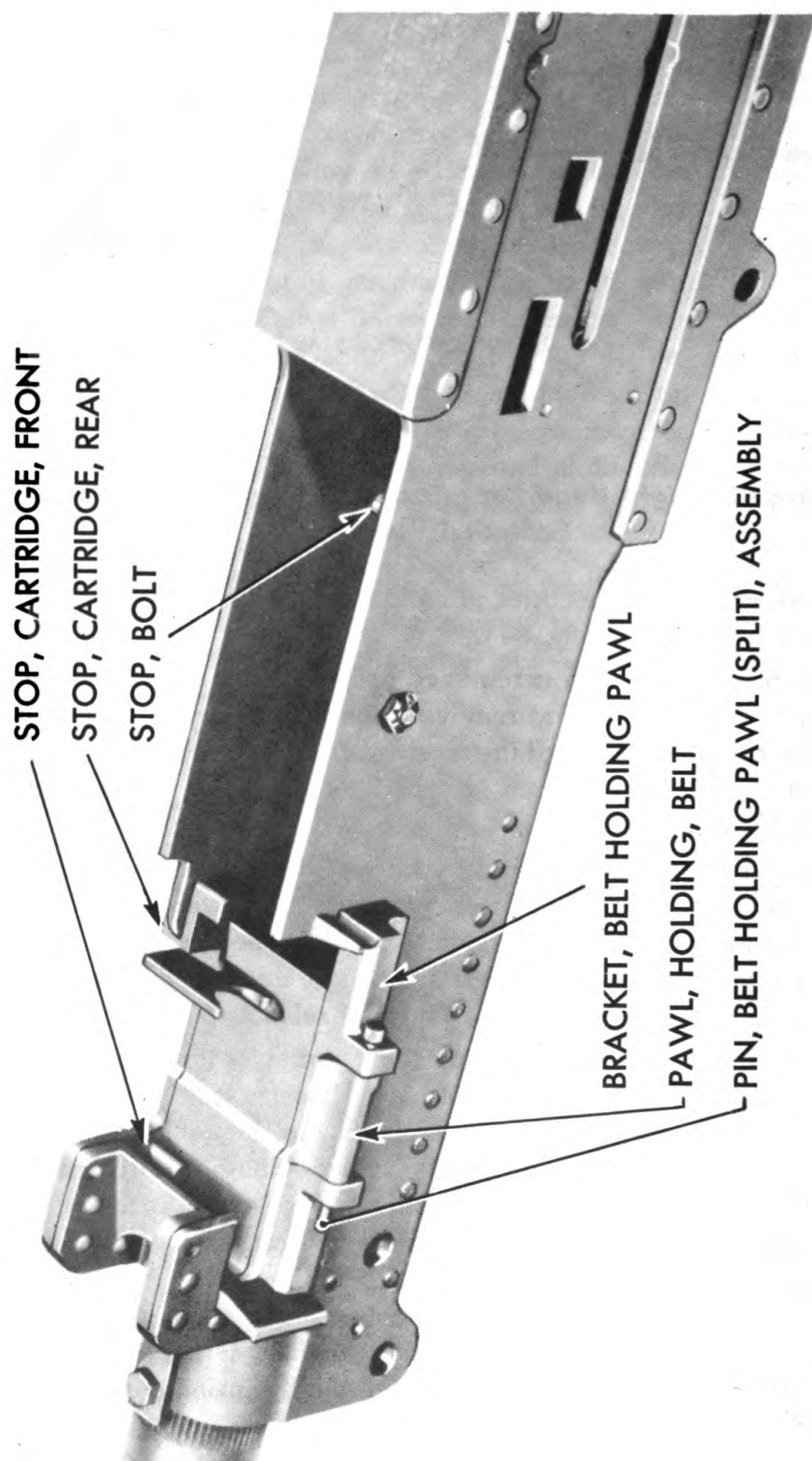
(4) The breech lock cam is removed by taking out the cotter pin on the bottom of the receiver and removing the nut. Take out breech lock cam bolt and cam from inside of the receiver. In some guns of early manufacture, the breech lock cam is attached by a staked screw inserted through the bottom plate.

(5) Remove the trigger bar pin by barely lifting the lock out of the small hole in the left side plate and rotating it downward (fig. 85). If it is rotated slightly forward of a vertical position, the key in the pin will pass through the keyway in the left side plate, and the pin can be removed by pulling out from the gun. This will release the trigger bar.

(6) If the gun is set up for single-shot, semiautomatic operation, it will be equipped with a bolt latch (fig. 36). If necessary to disassemble the bolt latch, reach into the rear of the opening in the top of the receiver and withdraw the cotter pin and slowly unscrew the bolt latch rod nut. Hold the bolt latch assembly firmly from the rear of the receiver while unscrewing the nut. **CAUTION:** Great caution must be used to prevent injury to personnel because of the strong spring pressure. When the nut has been removed, withdraw the bolt latch assembly from the mounting bracket. Be careful not to lose bolt latch plunger and plunger spring. When assembly has been removed, disassemble by pushing out the bolt latch pin. Disassembled parts are shown in figure 86.

(7) To remove the trunnion adapter, pull the trunnion block lock to the rear and give it a quarter turn. This will hold the lock out of engagement. When unscrewing the trunnion adapter with a suitable wrench,

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RA PD 51015

Figure 83—M1921 Casing Group

DISASSEMBLY AND ASSEMBLY

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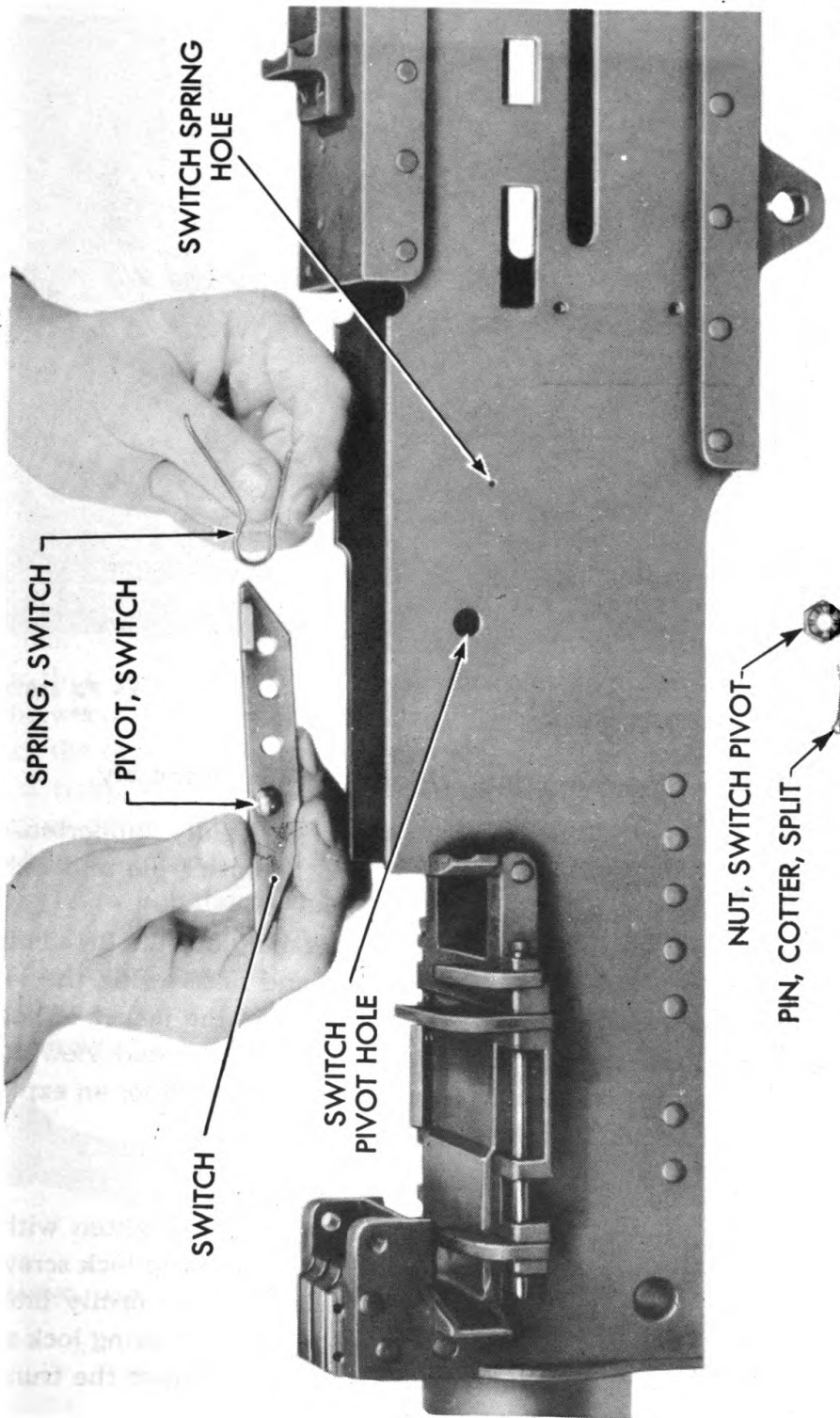
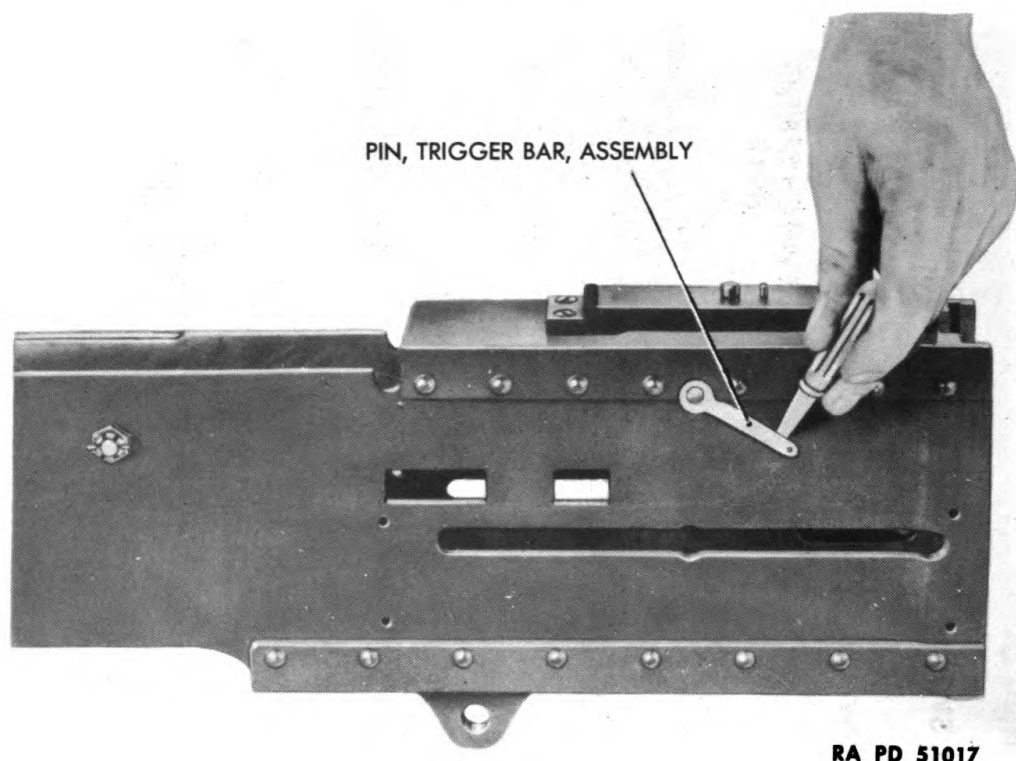


Figure 84 — Removing Switch And Switch Spring

**ORDNANCE MAINTENANCE—BROWNING MACHINE GUN, CAL. .50,
ALL TYPES**



RA PD 51017

Figure 85—Removing Trigger Bar Pin Assembly

the trunnion block (*not the receiver*) should be rigidly supported. Remove the trunnion adapter shim. Withdraw the cotter pin and remove the trunnion block lock and spring.

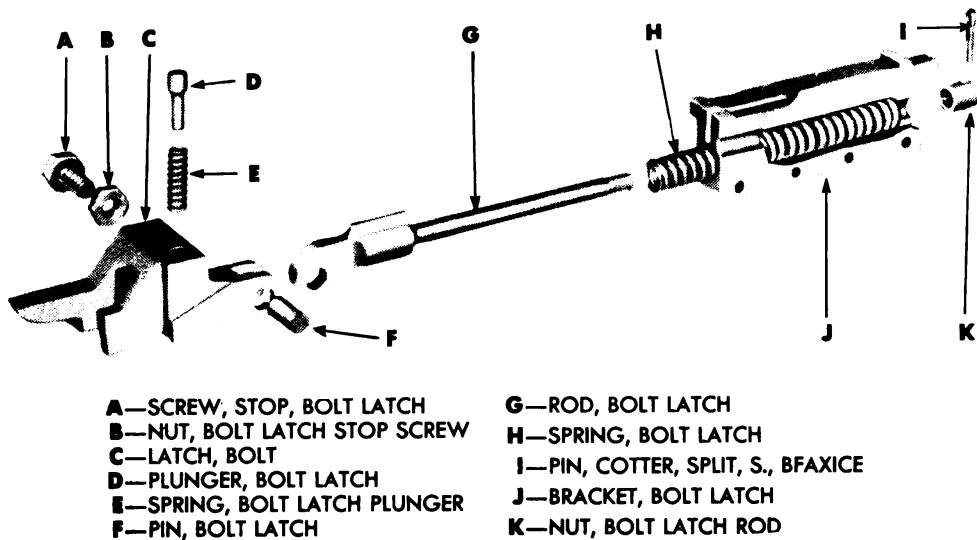
(8) The barrel jacket is removed by first taking out the breech bearing lock screw from the top of the trunnion and unscrewing the jacket with the combination wrench. The front bearing in the jacket ordinarily is not removed since the 2 screws are staked. An exploded view of the barrel jacket assembly is shown in figure 87. See figure 88 for an exploded view of the receiver and its related parts.

b. Assembly.

(1) Screw the barrel jacket into the trunnion and tighten with the combination wrench until the holes for the breech bearing lock screw are in alinement. If a new jacket is being installed, tighten firmly into the trunnion; then drill a hole in the jacket for the breech bearing lock screw with a No. 7 drill by mating through the hole in the top of the trunnion. Insert the breech bearing lock screw.

(2) In assembling the trunnion adapter to the trunnion, place the spring over the trunnion block lock and insert it from the front of the trunnion. Force the lock rearward and insert the cotter pin. Then give the lock one-quarter turn in either direction and the lock will be held to

DISASSEMBLY AND ASSEMBLY

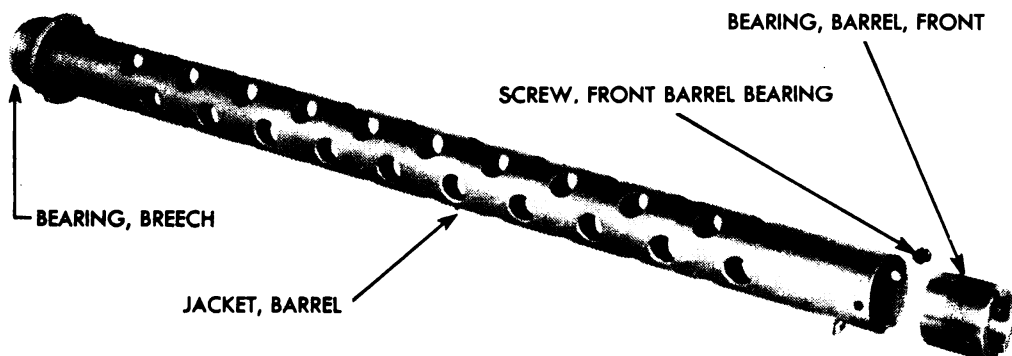


RA PD 51019

Figure 86—Bolt Latch Group—Exploded View

the rear. When a gun is reassembled, a shim of the next larger number than that previously used will generally be required to provide a tight fit between the trunnion and adapter when the parts are in alinement. Place the shim on the trunnion and screw on the trunnion adapter, drawing it tight. If the parts are not in alinement when drawn tight, use a shim of different thickness to obtain this condition. Give the trunnion block lock a quarter turn to release it and make sure that it seats properly.

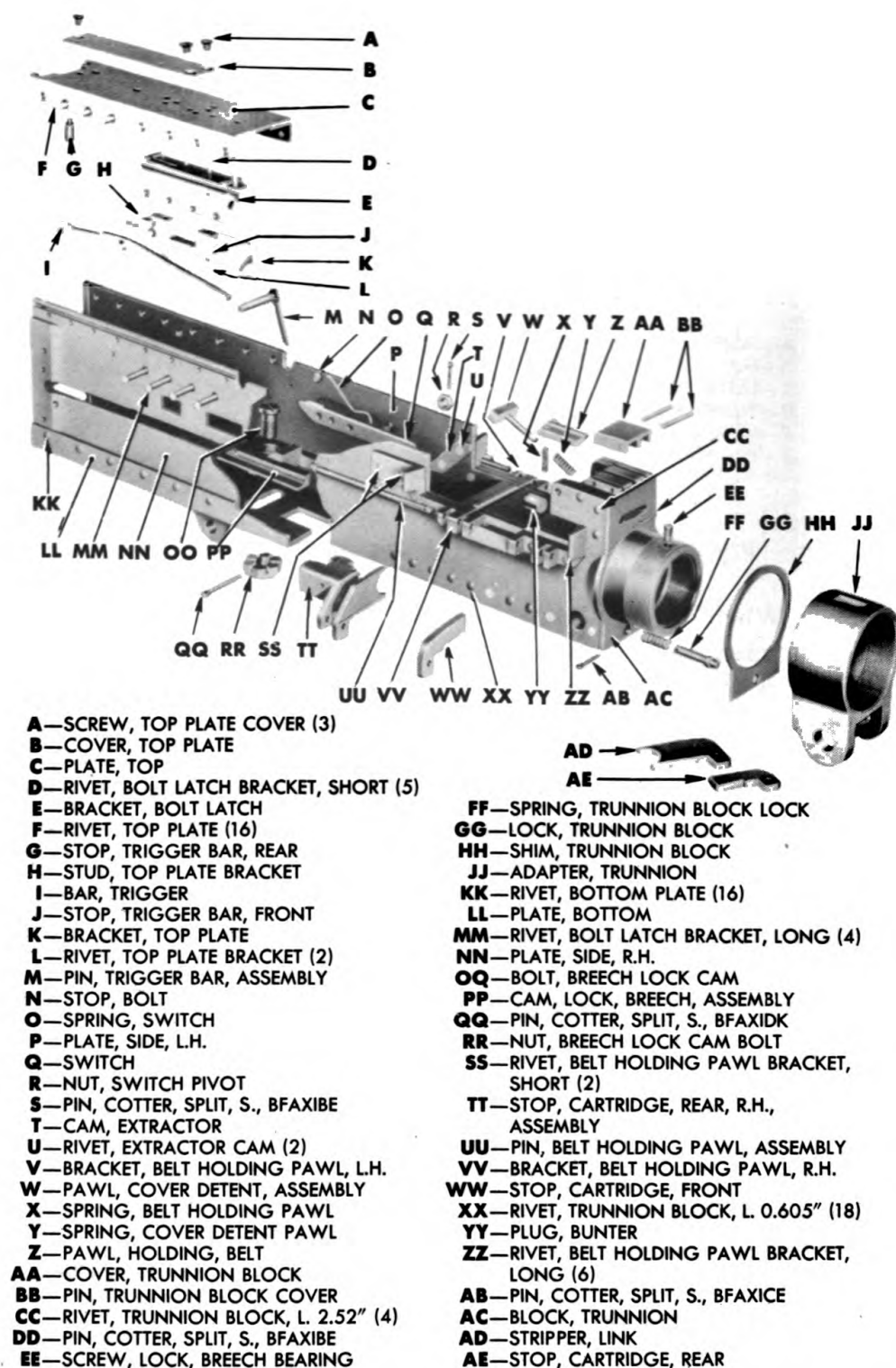
(3) If a bolt latch is being used, it must be assembled before the trigger bar is installed. Assemble the bolt latch and rod and insert the bolt latch pin. Insert the bolt latch spring in the bracket attached to the top plate as far as it will go. Next put the bolt latch rod into the spring as far as it will go without trying to compress the spring. Allow the bolt latch



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Figure 87—Barrel Jacket With Front Bearing Assembly—Exploded View

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RA PD 51021

Figure 88—Receiver Group—Exploded View

DISASSEMBLY AND ASSEMBLY

to hang downward in the empty receiver. The force necessary to compress the spring can be applied by placing a 6-inch section of wooden "two by four" into the receiver against downhanging latch and, with muzzle end of the gun against a solid support, press on the wooden block. If the rod is properly alined so that the key on the rod enters the slot in the top plate bracket, the threaded end will protrude from the front end of the bracket. Start the nut about 2 turns on the rod and release the pressure on the bolt latch. Insert the plunger and plunger spring in the latch and raise it until it clears the extension of the top plate bracket, and until the plunger spring is compressed. If necessary, back off *slightly* on the bolt latch rod nut if the latch will not clear the top plate bracket. After the latch is up in place, again apply pressure with the wooden block and tighten up on the nut until a cotter pin can be inserted.

(4) The trigger bar, with the long end forward and the bowed surface upward, is placed between the top plate bracket and the bolt latch bracket and held upward firmly. The trigger bar should project approximately $\frac{5}{16}$ inch beyond the rear trigger bar stop. With the trigger bar held in that position, insert the trigger bar pin, taking care to match the key on the pin with the keyway in the left side plate. After insertion, hold the pin assembly firmly against the side plate and rotate the lock rearward until the projection seats in the small hole in the side plate.

(5) The breech lock cam is installed with the beveled surface up and to the rear. Place the lower projection of the cam through the hole in the bottom plate, and insert the breech lock cam bolt from the top. See paragraph 53 for details of various breech lock cams. Screw the castellated nut on the bolt, *with the notches up*, and draw it tight. Back it off, only as necessary, to install a cotter pin. When so assembled, the breech lock cam should move or "float" slightly. Measured at the base of the U-shaped opening at the front of the cam, the clearance between the cam and the bottom plate should be between 0.001 inch and 0.008 inch. If the cam is attached with a screw, insert the screw from below, adjust float as stated above, and stake the screw.

(6) The switch is installed by first inserting the bent end of the hair-pin spring into the small hole in the switch recess of the left side plate. The spring is snapped into the recess. Slip the back end of the switch back into the recess, holding the switch firmly against the side plate and making sure the lug on the back of the switch rides on top of the spring. Push the threaded protrusion through the hole in the side plate and secure it with nut and cotter pin. The threaded stud is shouldered to prevent the nut from being drawn so tight as to cause the switch to bind against the side plate. Try the switch to see that it pivots and snaps back into position.

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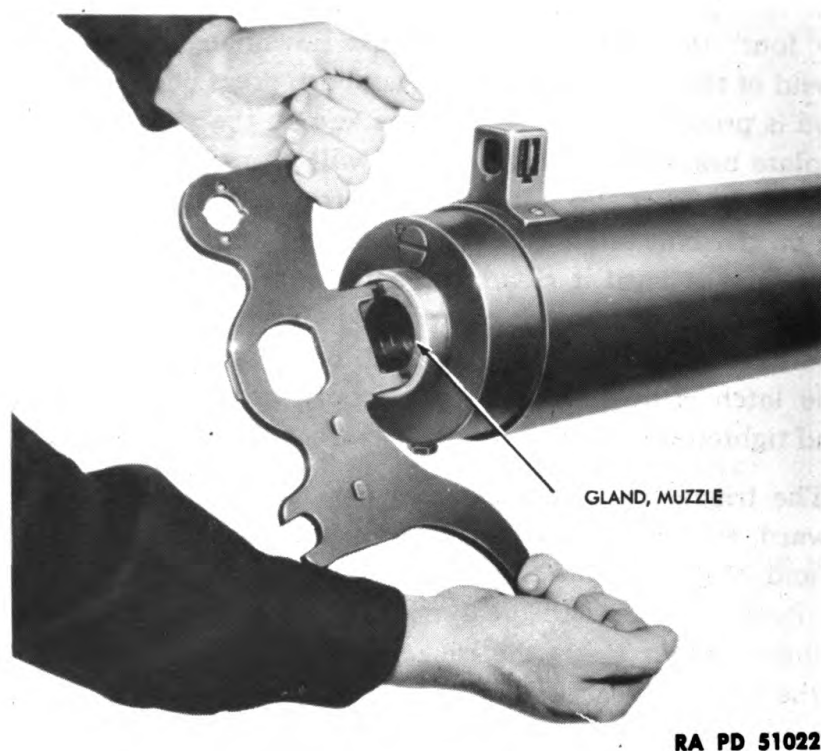


Figure 89—Removing Muzzle Gland

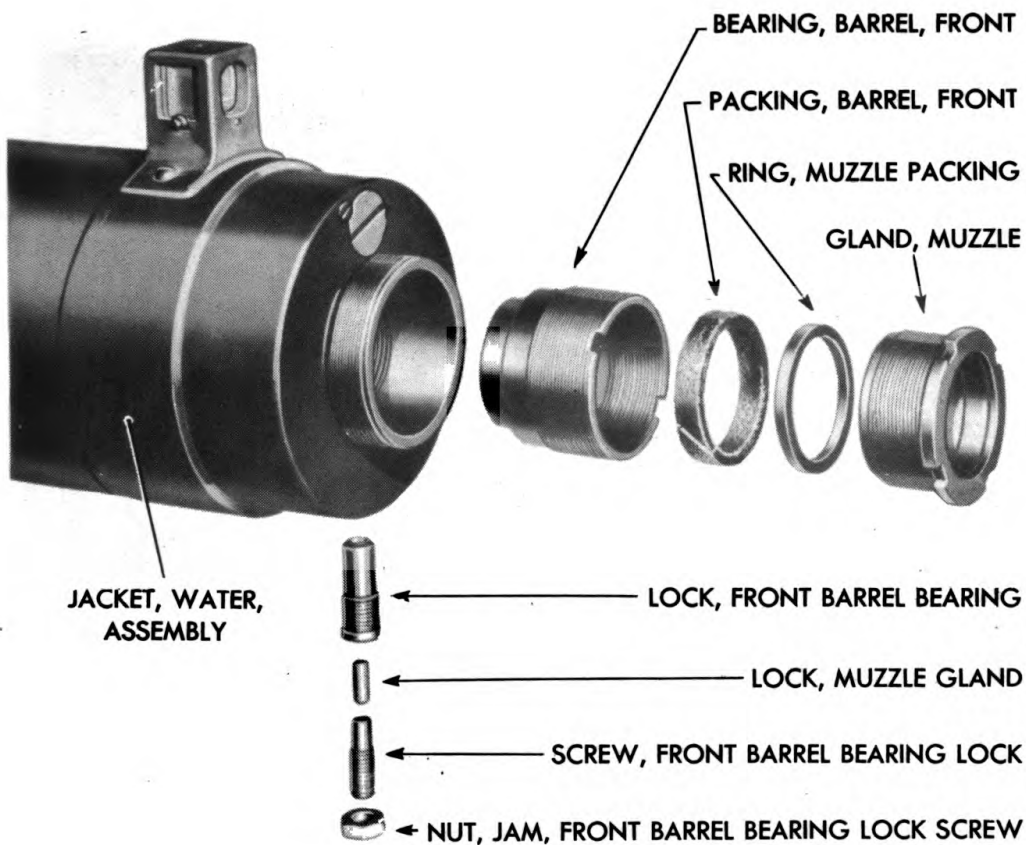
(7) The cover detent pawl spring is slipped over the detent pawl guide and both are then inserted in the hole in the trunnion from the rear. The spring is compressed and a cotter pin inserted.

(8) The trunnion block cover is set in place and secured with 2 pins.

(9) If the gun is to be equipped for left-hand feed, install a rear right-hand cartridge stop assembly and front cartridge stop on the right side of the receiver (fig. 80). The regular rear cartridge stop and link stripper can be used in place of the rear right-hand cartridge stop assembly. These are secured by inserting a belt holding pawl pin assembly. For left-hand feed, the belt holding pawl is placed in position on the left side of the receiver, the spring is seated and depressed, and the remaining belt holding pawl pin assembly is inserted. To equip the gun for right-hand feed, a front cartridge stop, link stripper and rear cartridge stop are installed on the left side of the receiver, and the belt holding pawl is installed on the right side.

NOTE: Guns of recent manufacture have twin belt holding pawl springs instead of a single spring. These twin springs differ from the single spring and care should be observed when replacing to use the correct spring or springs.

DISASSEMBLY AND ASSEMBLY



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Figure 90—Front Barrel Bearing Group (Water-Cooled Gun)—Exploded View

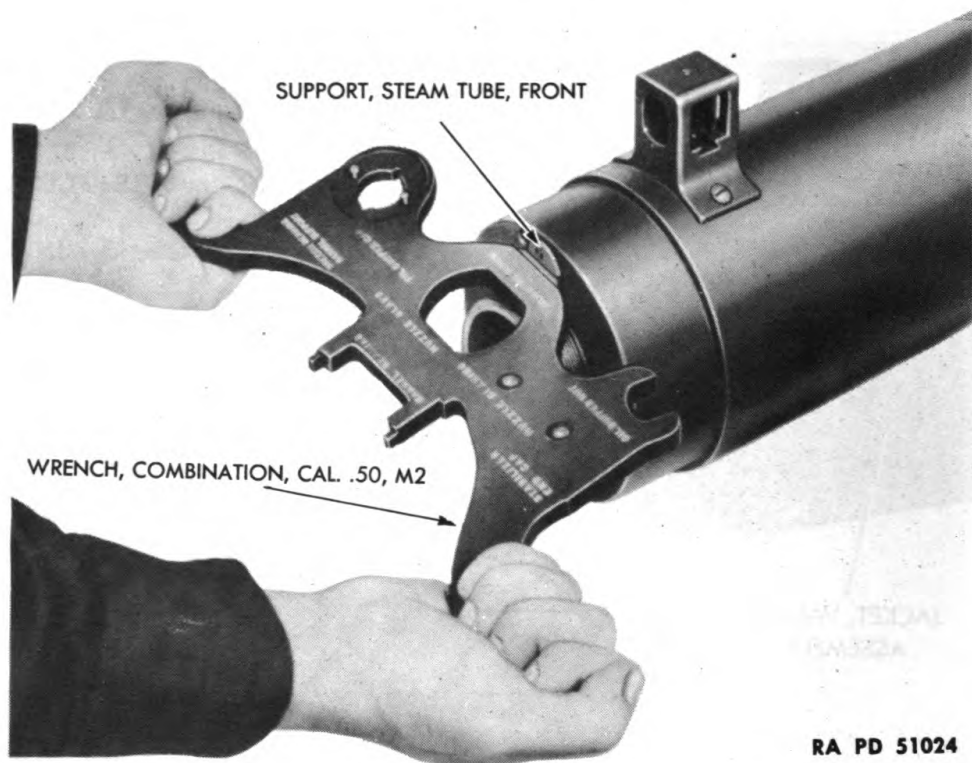
c. Water Jacket (M2 Guns).

(1) DISASSEMBLY.

(a) Remove the front end cap thread cover. Turn the gun bottom side up and loosen the front barrel bearing lock screw jam nut and remove the front barrel bearing lock screw and muzzle gland lock. Unscrew the muzzle gland using the combination wrench as shown in figure 88, and remove the muzzle packing ring and packing. Unscrew the front barrel bearing lock and after removing it, unscrew the front barrel bearing, using the combination wrench. An exploded view of these parts is shown in figure 90.

(b) Remove the front steam tube support lock screw. Notch in steam tube support should be noted and placed in the same relative position when reassembled. Loosen the front steam tube support, using the combination wrench as shown in figure 91. It may be necessary to improvise a large screwdriver to remove this piece if the combination wrench is not

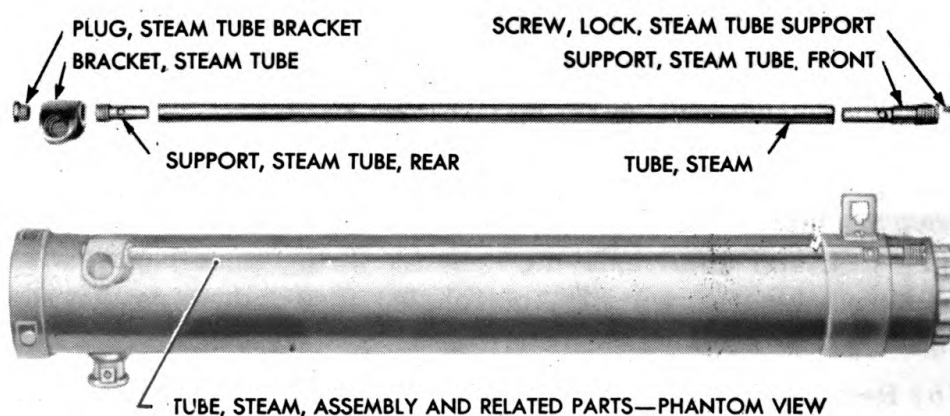
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RA PD 51024

Figure 91—Removing Front Steam Tube Support

adequate. The front of the water jacket should be slanted downward as the front steam tube support is loosened, so that the steam tube will slide forward out of the jacket as the front support is loosened and removed. An exploded view of the steam tube, together with a phantom



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**Figure 92—Water Jacket Group And Steam Tube Group—
Phantom And Exploded Views**

DISASSEMBLY AND ASSEMBLY

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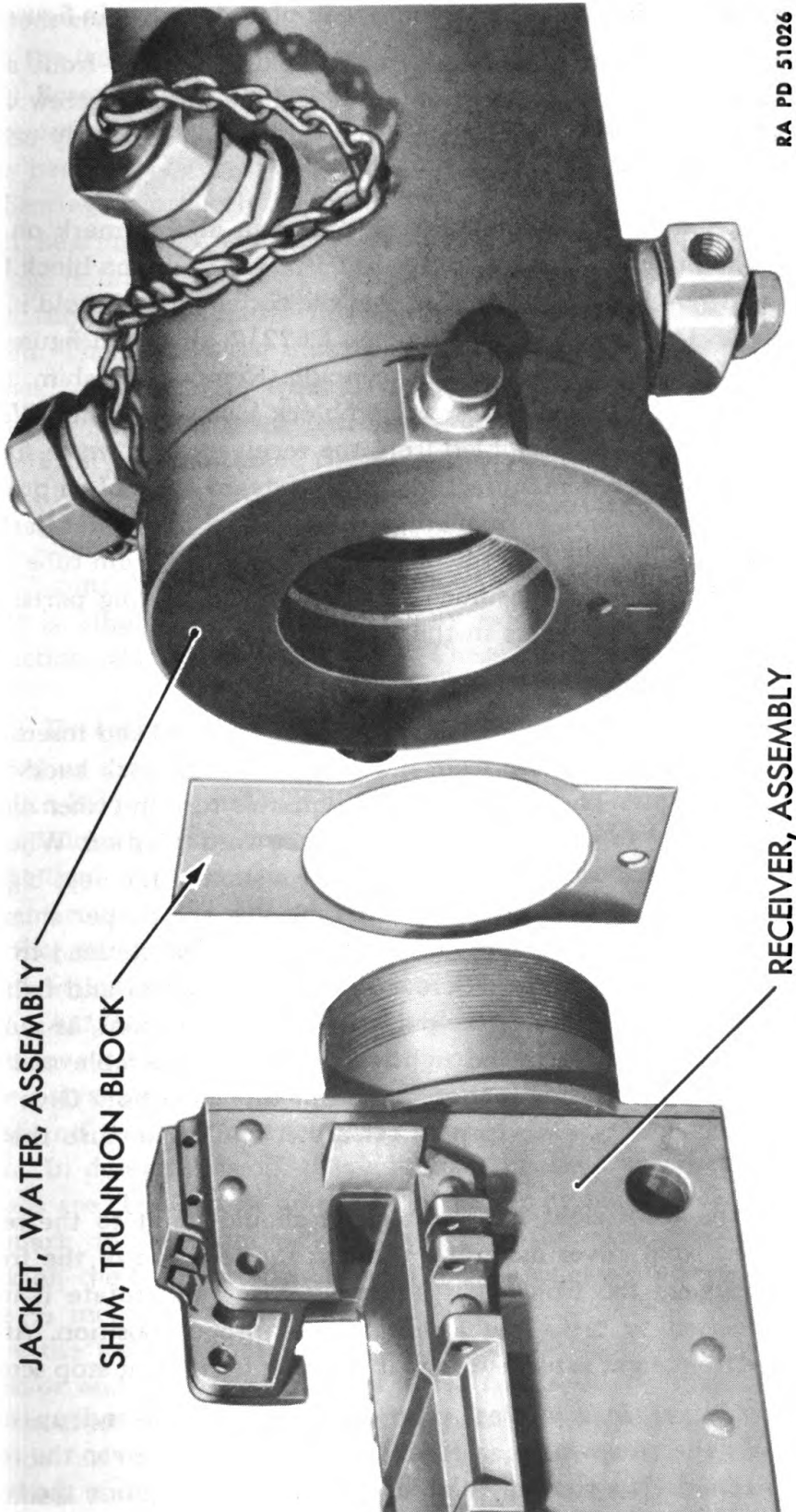


Figure 93 — Water Jacket Removed From Receiver

**ORDNANCE MAINTENANCE—BROWNING MACHINE GUN, CAL. .50,
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view of the water jacket with the steam tube in place is shown in figure 92.

(c) Remove the front sight stop screw and unscrew the front sight set screw about $\frac{1}{8}$ inch. Rotate the front sight adjusting screw in a counterclockwise direction, forcing the front sight cover assembly out of the left side of the front sight cover.

(d) Before removing the water jacket, make an alining mark on the water jacket and trunnion with a cold chisel. Pull the trunnion block lock to the rear and give it a quarter turn so that the cotter pin will hold it out of engagement. Use the strap pipe wrench C67217, shown in figure 41, to unscrew the water jacket from the trunnion. Remove the shim, take out the cotter pin and remove the trunnion block lock and spring. Water jacket of the M2 Gun disassembled from the receiver is shown in figure 93. Some guns of recent manufacture have a steam tube of improved design that is rigidly and permanently mounted in the water jacket. Such guns may be identified by the absence of the front steam tube support on the front end cap. Inasmuch as there are no moving parts, the only possible repair is of leaks in the water jacket.

(2) **ASSEMBLY.**

(a) Place the trunnion block lock spring over the lock and insert the lock in the hole in the trunnion from the front. Push the lock backward and insert a cotter pin. Then give the lock a quarter turn in either direction, and the cotter pin will hold the lock in rearward position. When a gun is reassembled it is usually necessary to use a shim of the next higher number than the one previously used. After placing the proper shim in position against the trunnion, apply an even coating of white lead to the threaded section of the trunnion. Screw on the water jacket and tighten it with the strap pipe wrench. If the parts are not in alinement, as shown by the index mark, when screwed tightly together, disassemble and reassemble with proper thickness shim to obtain this condition. Give the trunnion block lock a quarter turn to release it and make sure that it seats properly.

(b) When the front sight is assembled, it should point to the rear. Insert the front sight cover assembly through the left side of the front sight cover. Engage the front sight adjusting screw and rotate it in a clockwise direction to bring the assembly into proper position. After tightening the front sight set screw, lock it with the front sight stop screw.

(c) Place the gun in a vertical position with the front end up, and carefully insert the steam tube so that its lower end slips over the rear steam tube support. If a rod is available, it can be used to guide the tube into position. Insert the front steam tube support into position inside the steam tube and screw it tightly into the front end cap using the com-

DISASSEMBLY AND ASSEMBLY

bination wrench. When the notch in the support is properly positioned, insert the front steam tube support lock screw.

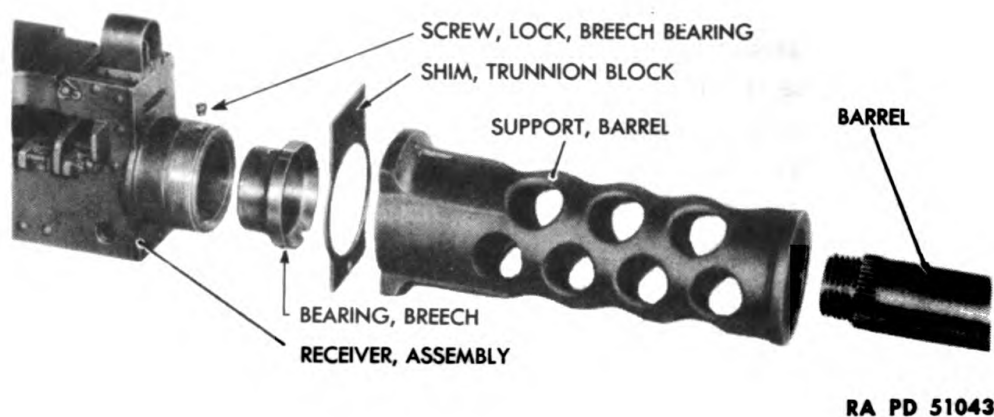
(d) Screw the front barrel bearing into the end cap until the hole in the bearing lines up with the hole for the front barrel bearing lock. (If a new bearing is being used, the hole must be drilled in the bearing after the bearing is properly screwed into position.) Then insert the front barrel bearing lock and set it tight. Insert the front barrel packing, pressing it firmly against its seat and insert the muzzle packing ring. Screw the muzzle gland firmly against the ring using the combination wrench. Then insert the muzzle gland lock and the front barrel bearing lock screw into the front barrel bearing lock, and screw in tightly, locking it with the front barrel bearing lock screw jam nut. Screw on the front end cap thread cover.

d. **Water Jacket (M1921A1 Guns).** Procedure for the disassembly of the water jacket of these guns is generally similar to that given above for M2 guns; however, this main difference should be noted. The water jacket is attached to the trunnion by a sweat connection (a screwed connection which is also soldered). These guns have no trunnion block lock.

(1) **DISASSEMBLY OF WATER JACKET FROM TRUNNION.** Before disassembling these parts, make an alinement mark with a cold chisel on the trunnion block and end cap of the water jacket. Clamp the gun in a vise at the trunnion, using copper jaws to protect it. Heat the joint by playing the flame of 2 blow torches on it. When little beads of solder begin to appear around the seam where water jacket meets the trunnion, it is a sign that the parts are hot enough to unscrew. When proper heat is obtained, little force is needed to unscrew the water jacket.

(2) **ASSEMBLY.** Before assembling these parts, clean them thoroughly to remove all solder residue. Special care must be taken in cleaning these parts, as solder will not adhere properly to rusted or corroded metal, and the success of this work depends largely on getting these parts clean. In doing this work it is advisable to use a wire brush. When the threads are clean, screw on the water jacket by hand to find out how far the mark on the water jacket screws past the corresponding alinement mark on the trunnion. In order to have a tight joint, it is necessary to have $\frac{1}{2}$ inch of dead draw. This draw is accomplished as follows: Unscrew the water jacket and peen the outside shoulder of the trunnion block or end cap. In doing this work, care must be taken not to peen this shoulder too much. It is best to peen lightly all the way around the shoulder and then to try the jacket. Repeat this until the desired draw is obtained. Any high spots caused by peening should be removed with a fine file having a safe edge. Tin the threads on the water jacket and trunnion block, having parts hot enough to make solder flow smoothly.

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**Figure 94—Barrel Support Group Removed From Receiver—
Exploded View**

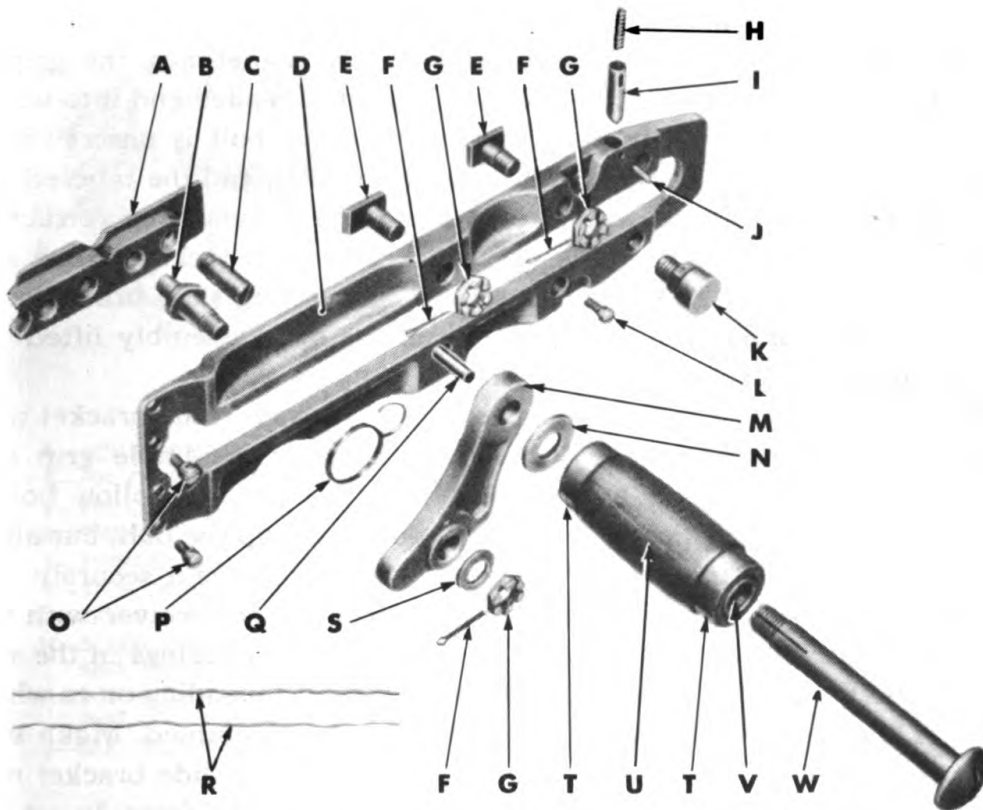
When threads of both parts are well coated with solder, clamp the gun at the trunnion block in a vise. Heat the trunnion just enough so that the solder will not run, and, before the trunnion block has a chance to get cold, heat the water jacket enough to soften the solder and start to screw it on. Keep the flame of 2 torches playing on the joint. Screw up to the alinement mark. It may be necessary to strike the wrench with a hammer to screw up the water jacket so that the alinement marks meet.

e. Heavy Barrel Support And Breech Bearing.

(1) **DISASSEMBLY.** Unscrew the barrel from the barrel extension and move it forward. Pull back the trunnion block lock and give it a quarter turn so that the cotter pin holds it out of engagement. Using the combination wrench, unscrew the barrel support. Remove the shim, take out the cotter pin, and remove the trunnion block lock and spring. Remove the breech bearing lock screw and unscrew the breech bearing from the trunnion block using the combination wrench. The disassembled parts are shown in figure 94.

(2) **ASSEMBLY.** Screw the breech bearing in the trunnion block and pull up tightly with the combination wrench so that the hole in the bearing lines up with the hole in the trunnion block. If a new bearing is being installed, screw it tightly into place and then drill a hole for the lock screw by drilling down through the hole in the trunnion block with a No. 7 drill. Then insert the breech bearing lock screw. Place the spring over the trunnion block lock and insert it from the front, compress the spring, and give it a quarter turn so the cotter pin will hold it rearward. When a gun is reassembled, it is usually necessary to use a shim of the next higher number than was used previously. With the shim in place, put the heavy barrel support on the trunnion block and draw it tight

DISASSEMBLY AND ASSEMBLY



A—SLIDE, RETRACTING
B—STUD, RETRACTING SLIDE LEVER
C—STOP, RETRACTING SLIDE LEVER
D—BRACKET, RETRACTING SLIDE
E—BOLT, RETRACTING SLIDE BRACKET
F—PIN, COTTER, SPLIT, S., BFX1BE
G—NUT, RETRACTING SLIDE
H—SPRING, RETRACTING SLIDE PLUNGER
I—PLUNGER, RETRACTING SLIDE
J—PIN, RETRACTING SLIDE PLUNGER
K—STUD, RETRACTING SLIDE
L—SCREW, RETRACTING SLIDE BRACKET, FRONT

M—LEVER, RETRACTING SLIDE
N—WASHER, RETRACTING SLIDE GRIP
O—SCREW, RETRACTING SLIDE BRACKET, REAR
P—SPRING, RETRACTING SLIDE LEVER, R. H.
Q—PIN, TAPER, NO. 4, BFCX1FB
R—WIRE, S., BFWX1A
S—WASHER, RETRACTING SLIDE LEVER STUD
T—FERRULE, RETRACTING SLIDE GRIP
U—GRIP, RETRACTING SLIDE
V—TUBE, RETRACTING SLIDE GRIP
W—BOLT, RETRACTING SLIDE GRIP. ASSY.

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**Figure 95—Right-Hand Retracting Slide Group Assembly—
Exploded View**

using the combination wrench. If the parts are not in alignment when screwed tightly together, disassemble and reassemble, using shim of proper thickness to obtain this condition. Release the trunnion block lock and make sure that it seats properly.

25. RETRACTING SLIDE GROUP DISASSEMBLY AND ASSEMBLY.

a. **Disassembly.** Remove the retracting slide lever from the bracket by taking out the cotter pin and removing the nut and washer. In some cases, the grip and related parts are attached to the lever by means of

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a solid bolt staked in place. In those cases, these parts are removed by unscrewing the bolt with a large screwdriver. Sometimes, the grip is attached by means of a hollow bolt with a split, threaded end into which a tapered pin is fitted. In such cases, before the bolt is unscrewed, a slender pin must be inserted in the hole in the bolt, and the tapered pin driven out. Take out the cotter pins and remove nuts from retracting slide bracket bolts and remove the bolts. Take out locking wires and remove 3 retracting slide bracket screws. Retracting slide bracket and slide assembly may then be removed and the slide assembly lifted out of the bracket. Exploded view is shown in figure 95.

b. **Assembly.** Place the slide assembly in its way in the bracket with the plunger engaging in the V-notch in the slide. Assemble grip and related parts to the lever by inserting the grip bolt. If a hollow bolt is being used which is split at the threaded end, draw up the bolt, but allow the handle to turn; then insert the tapered pin and drive it securely into place. Place the bracket in position on the side of the receiver with the front and rear bracket bolts properly inserted in the openings in the side plate. Use the proper retracting slide lever spring, depending on to which side of the receiver the retracting slide is to be assembled. Make sure that the beveled surface on the head of the retracting slide bracket rear bolt is to the rear and the front bolthead bevel is to the front. Insert the 2 short retracting slide bracket screws in the rear mounting holes of the bracket, and the long screw in the front mounting hole. Draw the screws up tight, secure them with locking wire, tighten the bracket bolt nuts, and insert cotter pins.

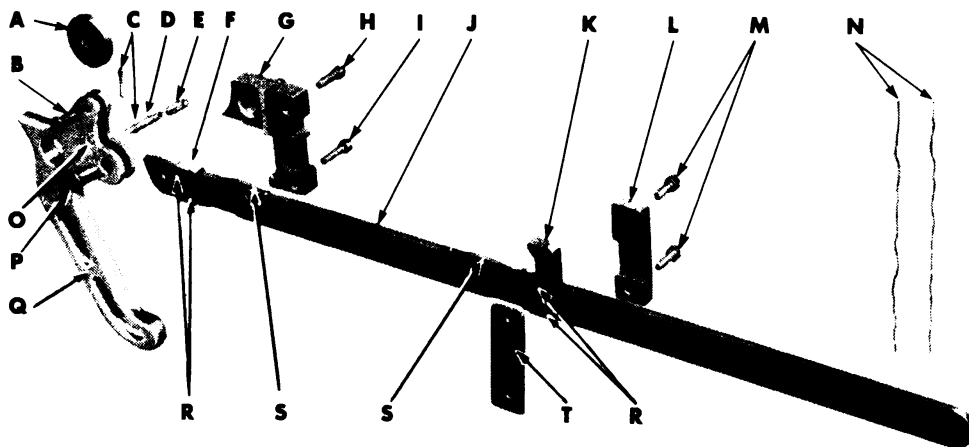
26. OPERATING SLIDE GROUP DISASSEMBLY AND ASSEMBLY.

a. **Disassembly.** To remove the slide from the gun, take out the locking wires and remove the operating slide guide screws and operating slide guides, front and rear. Withdraw cotter pin from operating slide roller pin, push out roller pin, and remove roller. Remove the cotter pin from the operating slide handle hinge pin, push out the hinge pin, and remove the slide handle, handle plunger, and plunger spring. See figure 96 for an exploded view of parts.

b. **Assembly.** Replace operating slide handle plunger spring, handle plunger and handle, and insert hinge pin and cotter pin. Place the operating slide roller in position; insert the roller pin and cotter pin. All parts of the operating slide are interchangeable permitting installation of the slide on either the right- or left-hand side of the gun. Place the slide in position on the receiver side plate, assemble the front and rear guides over the slide, and insert the operating slide guide screws.

NOTE: The 2 short screws are used in the front guide, the medium length screw in the bottom hole of the rear guide, and the longest screw

DISASSEMBLY AND ASSEMBLY



- | | |
|---|---|
| A—ROLLER, OPERATING SLIDE | K—HOOK, OPERATING SLIDE |
| B—PIN, OPERATING SLIDE ROLLER | L—GUIDE, OPERATING SLIDE, FRONT |
| C—PIN, COTTER, SPLIT, S., BFA11BB | M—SCREW, OPERATING SLIDE GUIDE, FRONT |
| D—SPRING, OPERATING SLIDE PLUNGER | N—WIRE, S., BFWX1A |
| E—PLUNGER, OPERATING SLIDE HANDLE | O—PIN, STOP, OPERATING SLIDE HANDLE |
| F—STOP, OPERATING SLIDE | P—PIN, HINGE, OPERATING SLIDE HANDLE |
| G—GUIDE, OPERATING SLIDE, REAR | Q—HANDLE, OPERATING SLIDE |
| H—SCREW, OPERATING SLIDE GUIDE, REAR, UPPER | R—RIVET, S., CK-HD., $\frac{1}{8} \times \frac{3}{8}$ |
| I—SCREW, OPERATING SLIDE GUIDE, REAR, LOWER | S—SPRING, OPERATING SLIDE |
| J—BAR, OPERATING SLIDE | T—PIECE, BACK, OPERATING SLIDE GUIDE |

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Figure 96—Operating Slide Group Assembly—Parts Arranged For Assembly To Left Slide Plate—Exploded View

in the top hole of the rear guide. Lock the screws with safety wire.

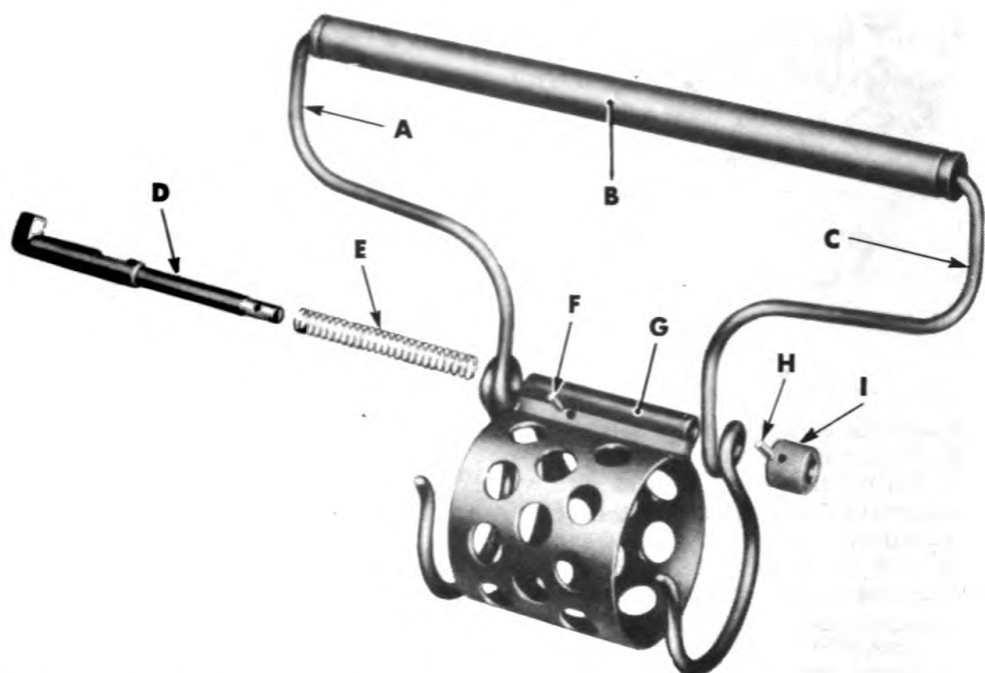
27. BARREL CARRIER ASSEMBLY, DISASSEMBLY AND ASSEMBLY.

a. **Disassembly.** Unscrew the barrel and remove it from the gun. Drive out the barrel carrier bolthead pin and remove the head. Remove the bolt retaining pin from the bolt sleeve. This pin holds the bolt against the pressure of the bolt spring and also keeps the bolt from rotating. Now rotate the bolt one-half turn so that the lug on the end of the bolt is turned away from the barrel, and slide the bolt from its sleeve. This action frees the wire handles, and the hooked ends can be forced out of the retaining grooves in the barrel. If necessary to replace a handle, turn the 2 handles in opposite directions and they will unscrew from the special nut contained within the handle sleeve assembly. The sleeve assembly can now be removed from the barrel. The disassembled parts of the carrier are shown in figure 97.

NOTE: The barrel carrier is used only with heavy barrel guns.

b. **Assembly.** Place the barrel carrier sleeve assembly on the barrel with the large opening in the bolt sleeve toward the breech of the barrel,

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A—HANDLE, BARREL CARRIER, REAR
B—SLEEVE, BARREL CARRIER HANDLE, ASSEMBLY
C—HANDLE, BARREL CARRIER, FRONT
D—BOLT, BARREL CARRIER

E—SPRING, BARREL CARRIER BOLT
F—PIN, RETAINING, BARREL CARRIER BOLT
G—SLEEVE, BARREL CARRIER, ASSEMBLY
H—PIN, BARREL CARRIER BOLT HEAD
I—HEAD, BARREL CARRIER BOLT

RA PD 51044

Figure 97—Barrel Carrier Assembly—Exploded View

and position it between the 2 deep grooves cut into the barrel. Assemble handles in handle sleeve assembly and force the hooked part of the 2 handles into the 2 grooves in the barrel. Place the bolt spring on the bolt, turn the carrier sleeve assembly so that the bolt sleeve lines up with the circular openings in the wire handles, and, working from the breech end of the carrier, slip the bolt and spring through the rear wire handle, into the bolt sleeve and on through the front handle. Turn the lug on the bolt until it enters one of the notches cut in the barrel. Then insert the retaining pin in the bolt sleeve. Place the head on the bolt, turn it until the holes in the head line up with the hole through the end of the bolt and insert the holding pin.

28. SIDE PLATE TRIGGER ASSEMBLY, DISASSEMBLY AND ASSEMBLY.

a. Disassembly. Loosen the side plate trigger nut and disengage the trigger bolthead from the side plate of the receiver or casing. Remove the nut and bolt from the trigger. Remove the trigger extension screw and

DISASSEMBLY AND ASSEMBLY

- A—BOLT, SIDE PLATE TRIGGER
- B—HOUSING, SIDE PLATE TRIGGER
- C—PIN, SIDE PLATE TRIGGER
- D—SPRING, SIDE PLATE TRIGGER
- E—CAM, SIDE PLATE TRIGGER
- F—SPRING, SIDE PLATE TRIGGER SLIDE
- G—PIN, SIDE PLATE TRIGGER SLIDE SPRING (IN EXTENSION)
- H—PIN, SLIDE PLATE TRIGGER SLIDE SPRING (IN CAM)
- I—EXTENSION, SIDE PLATE TRIGGER
- J—SCREW, SIDE PLATE TRIGGER EXTENSION
- K—HANDLE, SIDE PLATE TRIGGER
- L—NUT, SIDE PLATE TRIGGER
- M—PIN, COTTER, SPLIT, S., BFAXIBQ
- N—SLIDE, SIDE PLATE TRIGGER

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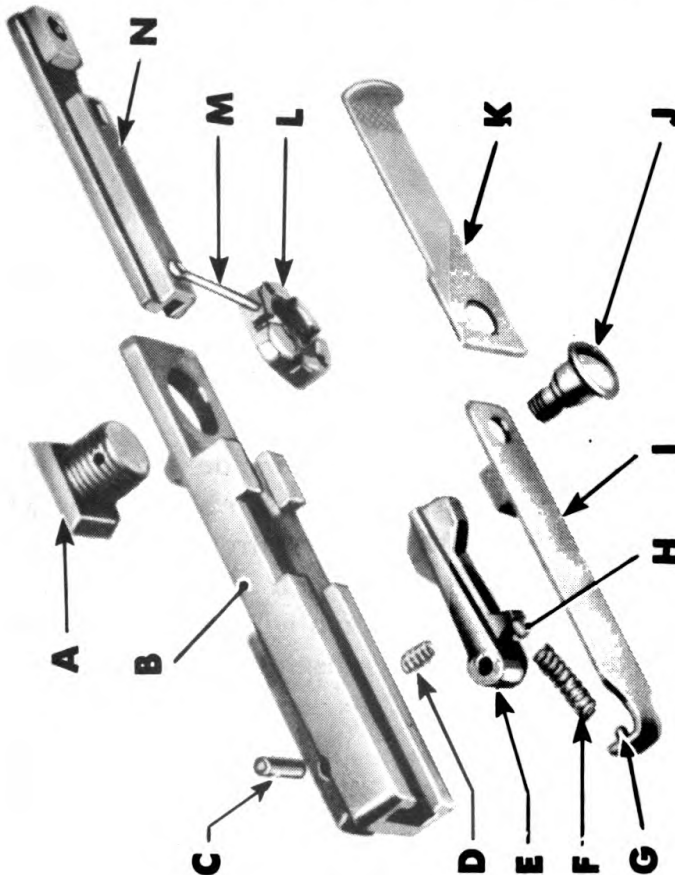
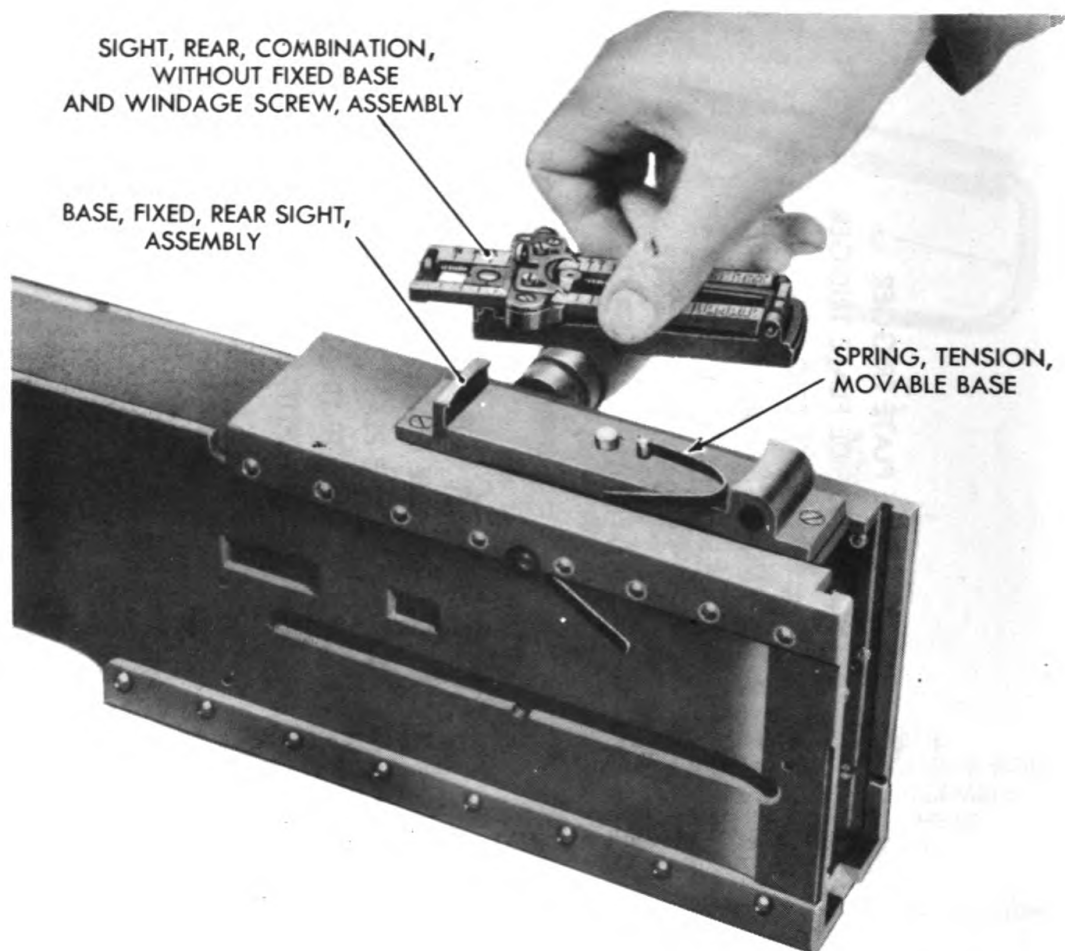


Figure 98—Side Plate Trigger Assembly—Exploded View

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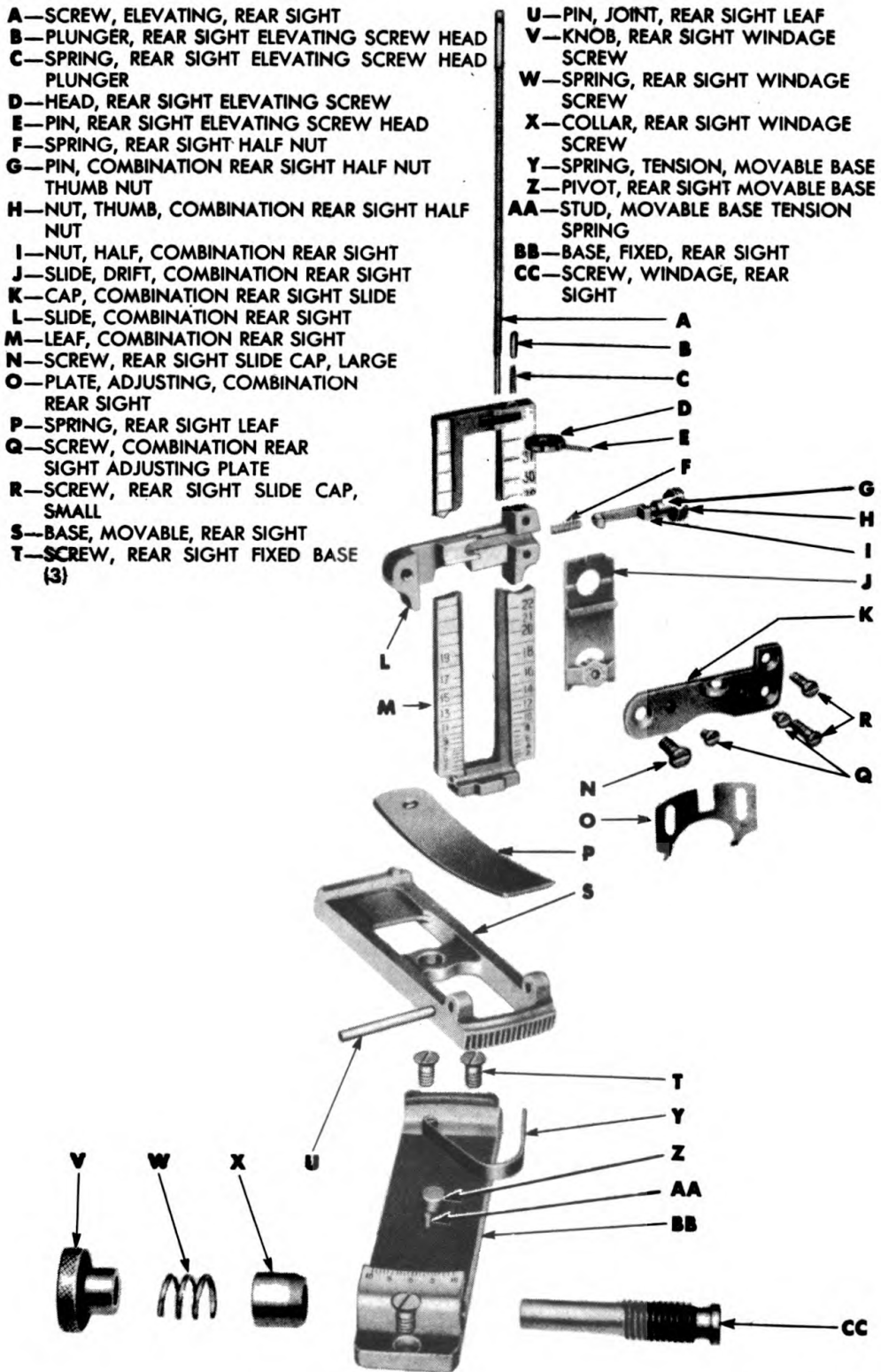
RA PD 51032

Figure 99—Removing Combination Rear Sight Assembly From Fixed Base

lift this end of the extension assembly and slide it to the left as viewed in figure 98. This action will release the trigger slide spring which should be removed. Force the trigger slide to the extreme right. It will be disengaged from the cam assembly and then can be removed from the trigger housing. Press out the trigger pin which will release the cam assembly and spring from the housing. The disassembled parts are shown in figure 98.

b. Assembly. Place the trigger cam assembly and spring in position in the housing, compress the spring, and insert the pin. Be sure both ends of spring are securely seated. Start the slide into the housing and force it over the cam assembly until the cam surface fits into its proper space in the slide. At this point the threaded hole in the slide will be directly over the small round hole in the housing. Place one end of the slide spring on

DISASSEMBLY AND ASSEMBLY



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Figure 100—Combination Rear Sight Group—Exploded View

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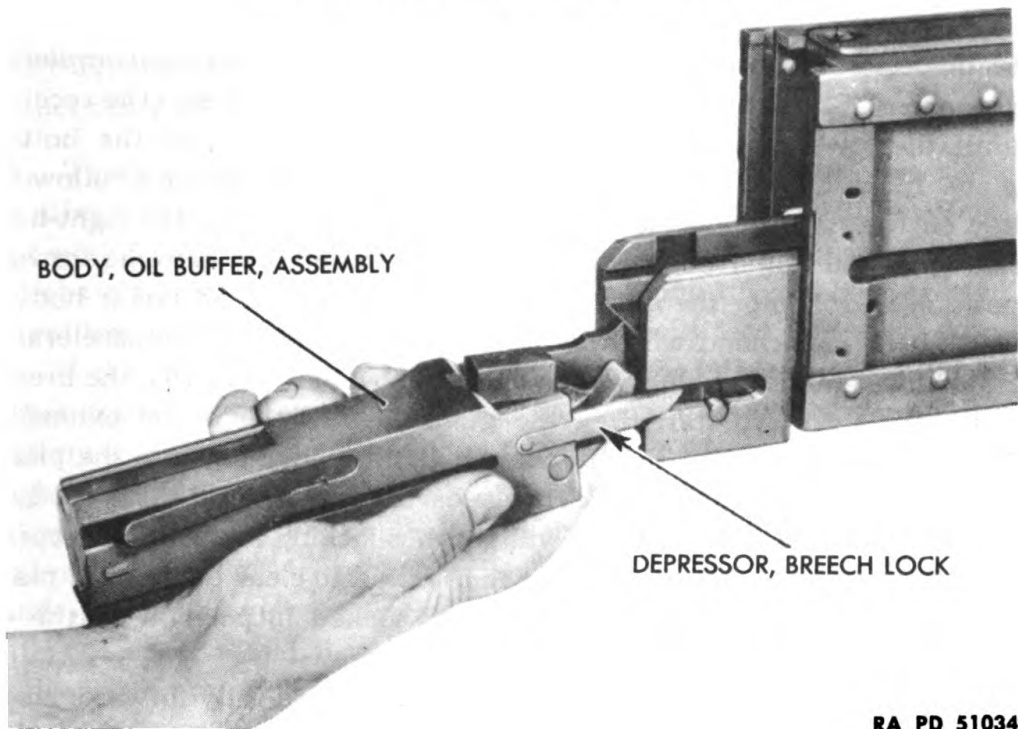
the pin inserted in the cam assembly, engage the other end with the pin on the extension, move the extension to compress the spring, and press down on the opposite end until the protrusion on the bottom of the extension fits into the notch in the slide. Insert the extension screw, draw it up tightly, and stake it in position. Force the slide to the right as far as it will go, and note that the cam surface is being moved and that the slide returns to the original position. The side plate trigger is now ready for installation on the receiver.

29. COMBINATION REAR SIGHT GROUP DISASSEMBLY AND ASSEMBLY.

a. **Disassembly.** Turn the rear sight windage screw until the teeth at the end of the movable base are disengaged from the threads on the windage screw. Rotate the movable base slightly farther by hand and lift straight up to remove it from the fixed base assembly (fig. 99). This will release the movable base tension spring. Place a screwdriver in the slot provided in the end of the windage screw, and hold it from rotating while pressing it on and turning the windage screw knob. The knob, spring, and collar will be released and can be removed. The screw will then be free to slide out on the opposite side of the fixed base. Drive out the pin holding the combination rear sight leaf assembly to the movable base, and slide the leaf spring from its recess in the movable base. The adjusting plate, slide cap, drift slide, and slide can be disassembled by removing their holding screws. The elevating screw is removed by driving out the screw head pin, and lifting the screw up through the screw head. Sliding the screw head from its recess will release the screw head plunger and spring from their recess. See figure 100 for exploded view of parts.

b. **Assembly.** Place the screw head spring and plunger in the recess provided; then slip the screw head in place to retain the spring and plunger. Slide the elevating screw down through the screw head, line up the hole in the end with the holes in the head, and insert the holding pin. Assemble the slide to the rear of leaf with the half nut thumb nut extending to the right-hand side of the leaf. Place the drift slide against the front side of the leaf and engage it with the slide. Place the cap in position and install the 3 holding screws. Next assemble the adjusting plate and its 2 holding screws. Place the end of the leaf spring with the hole into the retaining grooves in the movable base, line up the hole through the end of the leaf with the mounting holes in the movable base, and insert the pin. Place the one end of the movable base tension spring on the spring stud, and holding it compressed, lower the movable base onto its pivot until the spring is retained within the recess in the movable base. Insert the windage screw in the fixed base and place on the protruding

DISASSEMBLY AND ASSEMBLY



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Figure 101—Proper Position Of Oil Buffer Body For Assembly

end the collar, spring, and knob, in order named. Hold the end of the windage screw with a screwdriver, press on the knob until the spring is compressed, and turn to the locked position; then release. Turn the movable base until the teeth on the end engage with the windage screw and rotate the screw until the movable base assumes the desired position.

NOTE: The combination rear sight will not be assembled to water-cooled guns issued in the future. A field service modification work order is in process to authorize the removal of the sight from guns to which they are assembled; however, as there are probably many guns in service with such sights assembled, the disassembly and assembly are covered herein in case of emergency use.

30. REINSTALLMENT OF GROUPS.

a. After detailed disassembly of all groups has been completed, the parts properly inspected and reassembled, the major groups should then be assembled into the complete gun.

(1) **OIL BUFFER, BARREL EXTENSION AND BARREL GROUP.** The barrel should be screwed all the way into the barrel extension. The recoiling parts, however, may not go fully into battery until the headspace is adjusted. Check to see that the rear end of the barrel protrudes slightly into the barrel extension when screwed all the way in. If not, the barrel or barrel extension is defective and a true headspace adjustment cannot

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be made. *Headspace must be adjusted after the weapon is completely assembled.* The barrel and barrel extension are inserted into the receiver until the lower projection on the barrel extension strikes the bottom plate. Insert oil buffer into oil buffer body in proper position to allow the key on the spring guide to enter the slot at the front of the right-hand side of the oil buffer body. Be sure that oil buffer is in extreme forward position and is kept there during next operation. The oil buffer body is held in the right hand with the index finger holding up the accelerator. Holding the oil buffer body at an angle as shown in figure 101, the breech lock depressors are started in the guideways of the barrel extension. The body is then raised to a horizontal position, making sure the piston rod and barrel extension shank engage each other. The oil buffer body is then pushed forward as far as it will go, thus locking the body and barrel extension together. These parts are then raised to clear the bottom plate, and pushed forward in the receiver until locked in position by the oil buffer spring lock.

(2) **BOLT GROUP.** With the cocking lever pushed fully forward, insert the bolt in the receiver, taking care that the front end of the bolt does not tip the accelerator forward. If a bolt latch is in the gun, the end of the bolt latch should be held up so that it will not interfere with the bolt as the bolt is inserted. If a retracting or operating slide is to be used, the bolt is pushed forward until the bolt stud hole is in line with the enlarged opening in the side plate and the bolt stud inserted. Insert the driving spring rod assembly in the bolt and push the bolt completely forward. The driving spring is compressed and the driving spring rod retaining pin is inserted in its hole in the right side plate. With a suitable screwdriver, rotate the oil buffer tube until the arrow is 2 notches to the right of the "O" position. (In water-cooled guns, the initial setting is 6 notches to the left of the "C" position.) Be sure the oil buffer tube lock and oil buffer assembly are pushed forward so they will not interfere with the back plate.

(3) **BACK PLATE GROUP.** Replace the back plate assembly and make sure it is securely locked in position.

(4) **COVER GROUP.** To install the cover, place the *latch end* of the cover in position with the latch engaging the top plate. Then force the hinge end downward into position. Use a drift to secure alinement of the holes and insert the hinge pin. Insert the proper cotter pin in the hinge pin and make sure it is bent so the ends cannot interfere with the feeding of the ammunition.

NOTE: If the recoiling parts of the gun will not go fully forward into battery after the gun is assembled and before headspace is adjusted, it is probably due to tight headspace, or tight barrel packing (water-cooled guns).

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(5) **HEADSPACE.** Adjust headspace and check timing, following the instructions given in paragraphs 31 and 32.

b. Testing. Test action of the gun by pulling the retracting slide, operating slide, or bolt handle completely to the rear, and releasing. Parts must work freely. Dummy cartridges assembled into new, accepted metallic links should be fed into the gun and the bolt should be retracted several times to determine whether cartridges will feed and eject properly. If the gun is an aircraft weapon, the action of the gun should be further tested to determine whether the parts are working freely and properly so as to pull long cartridge belts into the feedway. A 17-pound weight should be attached by cable or cord to a belt containing 12 rounds of dummy cartridges. The cable or cord should pass over a pulley in such a manner that the cartridge belt extends horizontally from the feedway. Hand-operate the gun a sufficient number of times to assure that the feeding is positive and that the mechanism fully closes under action of the driving spring. This test should be applied to the gun with feed from both the left- and right-hand side.

31. HEADSPACE ADJUSTMENT AND CHECKING.

a. General. The headspace of a machine gun, with a cartridge fully seated in the chamber, is herein considered as the distance from the base of the cartridge to the face of the bolt. The headspace is adjusted by obtaining the proper distance between the face of the bolt and the breech end of the barrel. *The headspace adjustment must be checked before firing. Headspace must be adjusted with the gun fully assembled.* In order to make a true headspace adjustment, the dimensions of the rear end of the barrel must be such as to allow it to project slightly through the barrel extension when screwed in all the way. The barrel must be free from burs.

b. Adjustment.

(1) Retract the action (recoiling parts) of the gun about one inch and allow it to go forward into battery. It should just close without being forced. (When "in battery," the barrel extension should bear upon the trunnion block with the bolt *fully* locked.)

(2) If the action does not completely close, screw the barrel out of the barrel extension, one notch at a time, until it will just close without being forced.

(3) If the action snaps freely into battery, screw the barrel into the barrel extension, one notch at a time, until it will just close without being forced.

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(4) Then unscrew the barrel TWO notches.

NOTE: To screw the barrel into or out of the barrel extension, engage the serrations at the breech end of the barrel with a screwdriver or the point of a cartridge. The bolt may be hung by engaging the extractor with the bolt stop projecting from the left-hand side plate, while adjusting the barrel. For convenience in adjusting the barrel the right-hand cartridge stop assembly may be removed.

CAUTION: Care must be exercised to avoid roughening the barrel notches during adjustment. In case of the water-cooled gun, any binding between the barrel and packing must be eliminated, or a false adjustment may be obtained.

c. **Checking.** At this time, there are 2 gages furnished for checking headspace. The one is the headspace portion of the combination headspace and timing gage A196228 (fig. 38) which is a "GO" gage only. The other is a double ended "GO" and "NO-GO" gage A351211 which is fastened to separate "FIRE" and "NO-FIRE" timing gages A351214 and A351213 (fig. 39) to form the headspace and timing gage assembly A351217. At present, this latter gage is issued for use with aircraft guns only. The method of checking headspace for both gages is described in subparagraphs d and e, below.

d. **Checking Headspace Adjustment By Use Of Headspace And Timing Gage A196228.** This combination gage provides a definite means for checking headspace adjustment. The portion of the gage to be used for checking headspace is marked "HEADSPACE—0.200." The following procedure should be followed in checking headspace.

(1) After headspacing in the manner prescribed above, the barrel will protrude slightly beyond the inner face of the barrel extension.

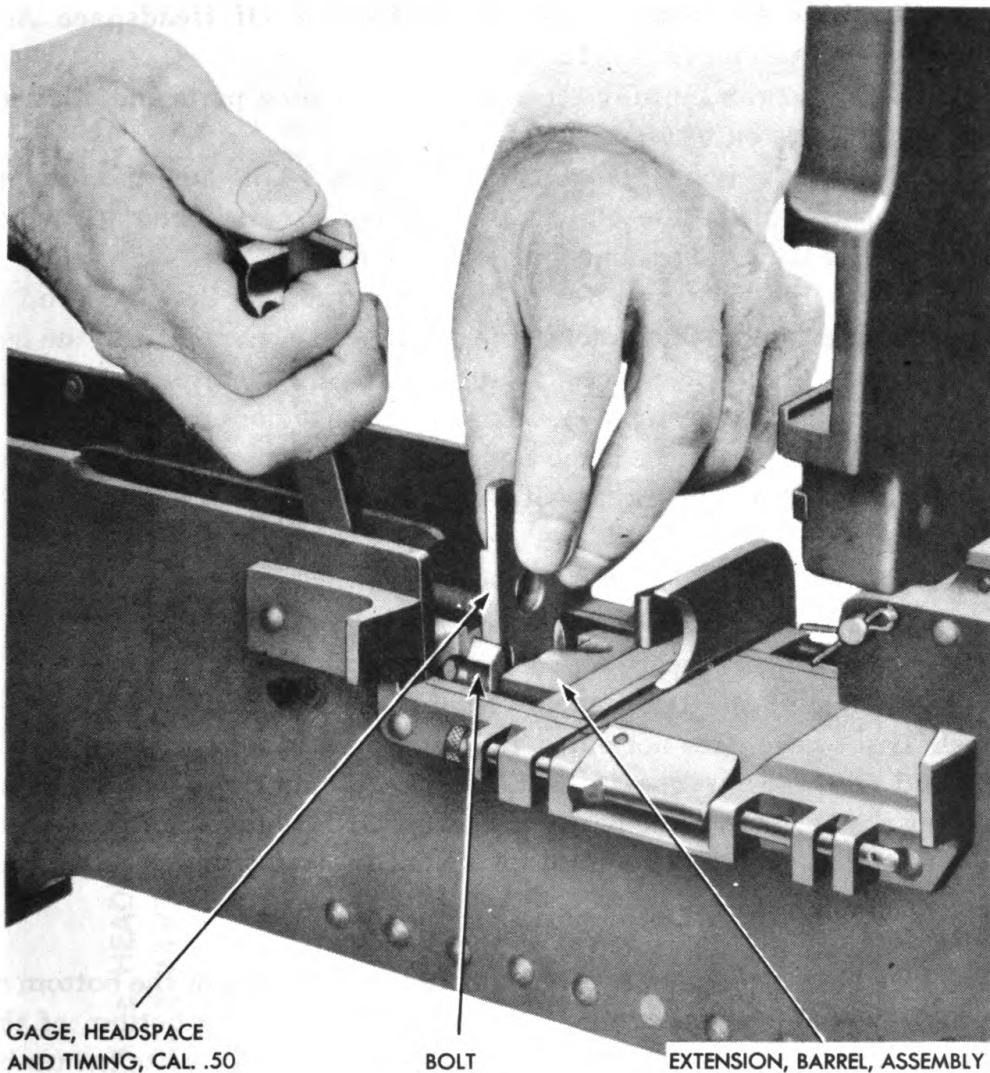
(2) Cock the firing pin by fully retracting the recoiling parts, and then allowing them to go fully forward into battery.

(3) Retract the bolt slightly (not more than $\frac{1}{16}$ inch) in order to relieve the driving spring pressure between the bolt and the rear end of the barrel, and place the forward face of the breech lock and bolt in close contact as when firing.

(4) Then, insert the gage in the T-slot between the face of the bolt and the rear end of the barrel (fig. 102). If the gun is headspaced too tightly, it will not be possible to insert the gage. If such is the case, the barrel should be unscrewed, ONE notch at a time, until the gage will just enter the full depth of the T-slot without being forced.

CAUTION: Never release the firing pin while the gage is inserted in the T-slot or the pin will be damaged.

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Figure 102—Using Cal. .50 Headspace Gage A196228

(5) If the gun has been headspaced in the prescribed manner, and if the headspace gage will just slide for its full length between the face of the bolt and the end of the barrel without being pushed downward, the headspace is correct. It must be clearly understood that the headspace gage is a "GO" gage which was designed particularly for the purpose of checking guns in installations when tight headspace would cause serious trouble.

(6) The gage, however, may be used to determine whether headspace is unnecessarily loose by screwing the barrel into the barrel extension, **ONE** notch at a time, until the gage will not enter, and then unscrewing the barrel **ONE** notch so the gage will enter properly.

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e. Checking Headspace Adjustment By Use Of Headspace And Timing Gage Assembly A351217.

(1) Cock the gun by fully retracting the recoiling parts and allowing them to return to battery position.

(2) Retract the bolt approximately $\frac{1}{16}$ inch. (This puts the forward locking surfaces of the breech lock and the bolt recess in contact, which is the position they will assume at the time of firing.)

(3) Check the headspace for *tightness* by inserting the "GO" end of the headspace gage in the T-slot between the face of the bolt and the end of the barrel. If the gage "goes" readily, check the headspace for looseness in accordance with step (4), below. If the gage does not "go" without being forced, the headspace is too tight. Correct by unscrewing the barrel one notch at a time, checking with the gage each time, until the gage enters easily.

CAUTION: Never release the firing pin with the gage in place, as to do so will damage the pin.

(4) Check the headspace for *looseness* by trying the "NO-GO" end of the gage in the T-slot between the face of the bolt and the end of the barrel. If the gage does not enter, the headspace is correct. If the "NO-GO" end of the gage "goes," the headspace is too loose. Correct it by screwing the barrel into the barrel extension, ONE notch at a time, checking with the gage each time, until the "NO-GO" end of the gage will not enter.

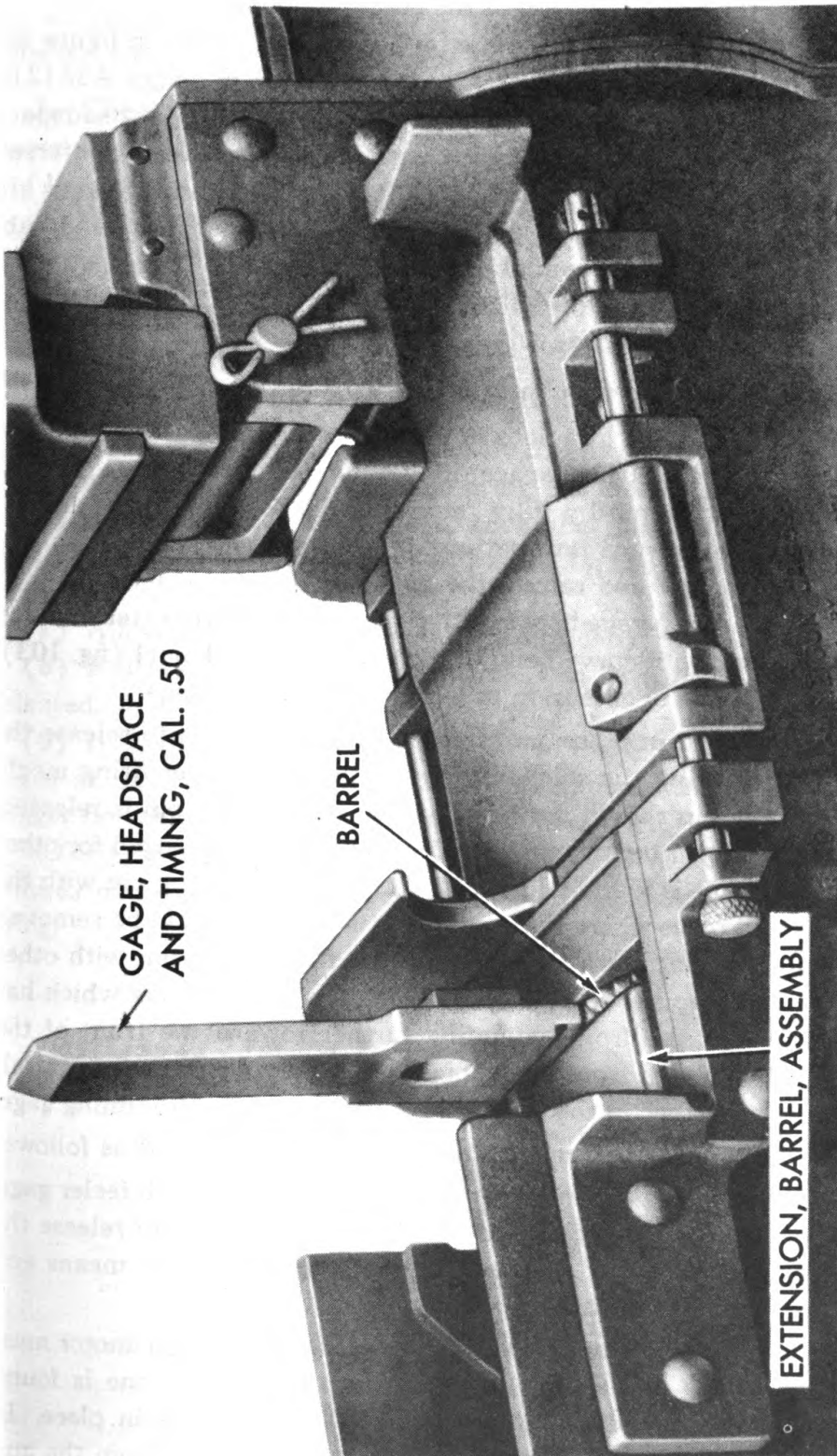
(5) Remove the gage and release the firing pin.

NOTE: This gage may be inserted from either the top or the bottom of the gun. In the event that the gage is inserted from the bottom of the gun, the slack between the bolt and the breech lock may be taken up by inserting a screwdriver between the bolt and the barrel. The width of the gage is such that this method is permitted.

32. TIMING CHECK.

a. The purpose of this check is to insure that the gun is not fired too early or too late by any of the various means employed to fire the weapon. In extreme cases of early timing, the gun will fire 2 shots and then stop because recoil from the second shot started before the extractor could engage the next cartridge in the belt. The gun must *not* fire earlier than 0.116 inch out of battery. On the other hand, if the gun fires too late while firing automatically, the barrel extension will strike the trunnion block as the recoiling portion moves forward on the counterrecoil stroke. During automatic firing, the gun must fire not later than 0.020 inch out of battery. Only when the first cartridge of a burst is being fired should the firing pin be released with the recoiling portion in the battery position.

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Figure 103—Using Cal. .50 Timing Gage A196228

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b. At this time there are 2 timing gages furnished for checking timing. The one is the timing portion of the combination headspace and timing gage A196228 referred to in paragraph 31 b and shown in figure 38. The other consists of separate "FIRE" and "NO-FIRE" gages A351214 and A351213 which are attached to the "GO" and "NO-GO" headspace gage to form the headspace and timing gage assembly A351217 referred to in paragraph 31 b and shown in figure 39. Both these timing gages are for the purpose of checking timing of aircraft guns as explained in subparagraph a, above. When available, the later gage A351217 should be used to check such guns in preference to gage A196228. The method of checking timing for both gages is given below.

c. Checking Timing With Headspace And Timing Gage A196228.

(1) To check that the gun does not fire too early, proceed as follows:

(a) Adjust and check headspace of the gun (par. 31).

(b) Cock the firing pin by fully retracting the recoiling parts and allowing them to go forward into battery.

(c) Raise the cover and retract the bolt slightly ($\frac{1}{4}$ inch).

(d) Insert the 0.116 gage between the front of the barrel extension and the trunnion block with curved end of the gage over the barrel (fig. 103).

(e) Allow the barrel extension to close slowly on the gage.

(f) With the gage in place, an attempt should be made to release the firing pin by operating the solenoid, trigger motor, or other firing mechanism. The firing pin should not be released. If the firing pin is released, the solenoid or trigger motor must be adjusted or else exchanged for other assemblies until one is found which will not release the firing pin with the gage in place. In cases where the trigger bar is used, it should be removed from the gun and placed on a trigger bar pin for comparison with other trigger bars. Line up the rear ends of the bars and select one which has the cam surface at the front extending further toward the front of the bar, or one on which the front end is higher than the one removed. Install this selected trigger bar in the gun and check again with the timing gage.

(2) To check that the gun does not fire too late, proceed as follows:

(a) Remove 0.116 gage and insert in its place a 0.020-inch feeler gage. With the feeler gage in place, an attempt should be made to release the firing pin by means of the solenoid or trigger bar, or other means employed. The firing pin must be released.

(b) If the firing pin is not released, the solenoid or trigger motor must be adjusted or else exchanged for other assemblies until one is found which will release the firing pin with the 0.020-inch gage in place. In cases where the trigger bar is used, it should be removed from the gun and placed on a trigger bar pin for comparison with other trigger bars. Line up the rear ends of the bars and select one on which the cam sur-

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face at the front does not extend as far toward the front of the bar, or one on which the front end is lower than the one removed. Install this selected trigger bar in the gun and check again with the feeler gage.

d. Checking Timing With The Headspace And Timing Gage Assembly A351217.

(1) Adjust and check headspace of the gun (par. 31).

(2) Cock the gun by fully retracting the recoiling parts and allowing them to go forward into battery.

(3) Retract the recoiling parts slightly and insert the "FIRE" portion A351214 of the timing gage between the barrel extension and the trunnion block.

(4) Allow the barrel extension to close slowly on the gage.

(5) Release the firing mechanism by means of the solenoid, or trigger bar, or other firing mechanism. The firing pin *should* be released.

(6) Remove the "FIRE" gage, cock the gun and insert the "NO-FIRE" gage A351213 as in steps (2) and (3), above, between the barrel extension and the trunnion block.

(7) Allow the barrel extension to close slowly on the gage.

(8) Release the firing mechanism. The firing pin *should not* be released.

(9) If the firing pin does not respond to the "FIRE" and "NO-FIRE" gages as described above, adjustment or replacement of the solenoid, trigger bar or other firing mechanism is necessary.

NOTE: Synchronized guns need not be checked for timing unless failures to feed because of poor timing are encountered during actual firing.

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Section VII

INSPECTION

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Tools for inspection	33
General instructions for inspection	34
The gun as a unit	35
Complete inspection	36
Inspection check sheet and report, and trouble analyzer chart ..	37
Barrel	38
Head space and timing	39
Water jacket	40

33. TOOLS FOR INSPECTION.

a. The special tools and gages used for inspection are shown in section IV.

34. GENERAL INSTRUCTIONS FOR INSPECTION.

a. Inspection is made for the purpose of determining the condition of the weapon, whether repairs or adjustments are required, and the steps to be taken to insure that the gun is in serviceable condition. Before guns can be inspected, all grease, dirt, or other foreign matter must be removed. For instructions on the proper methods of cleaning, see section IX. Materials to be used in cleaning are listed in TM 9-850. For instructions on disassembling and assembling the weapon, see section VI.

35. THE GUN AS A UNIT.

a. The first step in making an inspection of the weapon is to check the condition of the gun as a unit (par. 15). Headspace and timing must be carefully checked and adjusted (pars. 31 and 32).

36. COMPLETE INSPECTION.

a. The parts requiring correction or replacement will be revealed only by a complete inspection of the weapon. The main points to be covered in a complete inspection are shown in the "Inspection Check Sheet and Report" form in paragraph 37. The points are presented in this manner for two reasons:

(1) It lists the main inspection points in a way that can be followed easily.

(2) It establishes an inspection form which can be reproduced by the organization for use of inspectors if desired.

b. The "Trouble Analyzer Chart" in paragraph 37 can be used as a guide in determining the cause of failures of the gun.

INSPECTION

37. INSPECTION CHECK SHEET AND REPORT, AND TROUBLE ANALYZER CHART.

a. Inspection Check Sheet And Report.

BROWNING MACHINE GUN, CAL. .50, MODEL SERIAL NO.

Order of Inspection	Inspected Check (✓)	Parts Needing Correction Check (✓) Here
BACK PLATE GROUP		
Buffer plate (required projection from back plate, $\frac{3}{16}$ inch)		
Buffer disks (need replacement)		
Adjusting screw (loose or threads stripped)		
Adjusting screw plunger and spring		
Back plate latch and spring		
Back plate latch lock and spring		
Back plate fits snugly in its grooves		
Oil buffer index finger (used with vertical buffer only)		
BOLT GROUP		
Bolt handle—projecting end max. length, 0.585 in.		
Bolt stud (burred, bent, or entering end max. length, 0.585 in.)		
Driving spring rod assembly (broken or bent)		
Driving spring, inner, free length, 22.0 in. \pm 1.0 in.		
Driving spring, outer, free length, 22.0 in. \pm 1.0 in.		
Cam grooves and bolt switch (rough or burred)		
Extractor (broken or deformed)		
Ejector (broken or deformed)		
Ejector pin (loose or broken, or not staked)		
Ejector spring (weak or missing)		
Cocking lever (bent or broken)		
Sear stop pin (bent)		
Sear slide (binds or excessive play)		
Sear (burred, worn, or broken)		
Firing pin extension (burred notch)		

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Order of Inspection	Inspected Check (✓)	Parts Needing Correction Check (✓) Here
<p>BOLT GROUP—Cont'd</p> <p>Firing pin spring (new type, 0.059 in. diam. wire, free length, 3.218 in. \pm 0.06 in., old type, 0.050 in. diam. wire, length, 4.70 in. \pm 0.06 in.) The new type should be used in all guns</p> <p>Firing pin (burred, broken, or tight)</p> <p>Firing pin protrusion, at least $\frac{1}{16}$ in. from bolt</p> <p>Firing pin hole, use gage A77200. If gage (0.084 in.) enters hole, bolt is unserviceable (par. 10 a (2))</p> <p>T-slot (broken or burred lips)</p> <p>Extractor stop pin (broken). Chamfer on opening of driving spring rod hole, 60 degrees</p> <p>NOTE: Unserviceable bolt assemblies having recoil plates which are serviceable, except for the enlargement of the firing pin hole, and serviceable bolts found to have oversized firing pin holes, should be sent to Rock Island Arsenal for reworking. Broken or otherwise unserviceable bolt assemblies may be disposed of locally.</p>		
<p>OIL BUFFER GROUP</p> <p>Body spring lock (tension and burs)</p> <p>Tube lock (weak, short, or worn stud)</p> <p>Breech lock depressors (worn, bent, or too loose)</p> <p>Accelerator (burred or broken)</p> <p>Oil buffer spring (free length, $5\frac{7}{8}$ in. \pm $\frac{1}{8}$ in.)</p> <p>Spring guide (burred or missing key)</p> <p>Piston rod (bent, worn at packing, or notch burred)</p> <p>Packing gland parts (plug, packing, ring, spring)</p> <p>Piston rod head (burred)</p> <p>Piston valve assembly (burred or keys missing)</p> <p>NOTE: There is no piston valve assembly in H.B. guns.</p> <p>Filler screws (loose or leaking)</p> <p>Tube (properly filled with oil of latest specification)</p>		

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Order of Inspection	Inspected Check (✓)	Parts Needing Correction Check (✓) Here
<p>OIL BUFFER GROUP—<i>Cont'd</i> Oil buffer assembly length (from rear face of buffer tube to extreme forward face of the oil buffer piston rod should be between 6.525 in. and 6.553 in., as explained in paragraph 63 h.)</p>		
<p>BARREL EXTENSION AND BARREL GROUP Barrel extension shank (crooked, loose, or broken) Barrel locking spring (broken or worn) Breech lock (burs and binding) Looseness in threads when screwed to barrel Burs in bolt guides or breech lock slot Barrel (see paragraph 38 for complete barrel inspection)</p>		
<p>COVER GROUP Detent pawl (binding or failure) Cover latch (burred or broken) Cover latch spring (weak or missing) Cover extractor spring (weak or missing) Cover extractor cam (burred, broken or loose) Belt feed lever (bent or lug broken or burred) Plunger and spring (weak or missing) Pivot stud (loose or burred) Belt feed slide (burred or pawl pin protrudes) Belt feed pawl (burred—weak spring tension) Pawl arm (bent or pins bent or missing) Free movement of belt feed lever</p>		
<p>RECEIVER AND BARREL (WATER) JACKET GROUP Rivets and bolt stop (loose or missing) Switch (movement and spring tension) Trigger bar (bent or sluggish action)</p>		

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Order of Inspection	Inspected Check (✓)	Parts Needing Correction Check (✓) Here
<p>RECEIVER AND BARREL (WATER) JACKET GROUP—<i>Cont'd</i></p> <p>Trigger bar pin (broken lock)</p> <p>Breech lock cam adjustment (should "float" slightly, 0.001 in. to 0.008 in.)</p> <p>Breech lock cam (check for burs, also dirt under cam)</p> <p>Cartridge stops and link stripper (position and condition)</p> <p>Belt holding pawl (condition of pawl and spring)</p> <p>Receiver side plates (cracks at back plate grooves)</p> <p>Receiver side plates (clearance for free movement of bolt stud)</p> <p>Receiver side plates (clearance for free movement of bolt). Total clearance, both sides, with bolt in battery position, measured at rear of bolt, between 0.012 in. and 0.023 in.</p> <p>Receiver side plate—check right-hand side plate for clearance cut at top edge extending back 4¼ in. from feedway for belt feed lever (par. 50 a)</p> <p>Barrel jacket (straight and free from binding)</p> <p>Barrel jacket—excessive amount of weld metal at breech bearing</p> <p>Front barrel bearing (burs or missing screws)</p> <p>Front sight (loose or out of alinement)</p> <p>Rear sight (loose or missing base screws, friction in windage screw, action of half nut and elevating screw. Also check rear sight aperture disk operation, and tension of leaf spring.)</p> <p>Side plate trigger (looseness and burs, tension of spring and cam operation)</p> <p>Retracting slide (loose nuts or bracket screws: check for burs and weak lever spring and plunger spring)</p> <p>Operating slide (loose guide screws, bent slide bar, burs, loose hook, or weak slide springs)</p> <p>Water jacket (par. 59)</p>		

INSPECTION

b. **Trouble Analyzer Chart.** This chart lists possible failures in the functioning of the gun and possible contributing causes. It deals principally with *aircraft* guns but may be applied to common parts of guns of other models where applicable.

POSSIBLE CAUSES	FAILURES												
	Short round	Failed to fire	Failed to feed	Bullet pulls out of case	Separated case	Cartridge deformed or split near head	Tight headspace	Loose headspace	Loose headspace, cannot adjust	Headspace changes while firing	Action will not close	Action will not open properly	Fires a few rounds and stops
BARREL													
1. Threaded surface of barrel short	X			X	X	X		X	X			X	X
2. Barrel warped		X									X	X	X
3. 13.31-lb barrel in an 850-rate gun		X	X								X	X	X
4. Barrel locking spring broken	X	X	X	X	X	X		X	X	X		X	X
5. Stud on barrel locking spring worn	X	X	X	X	X	X		X	X			X	X
6. Obstruction in barrel chamber	X	X	X	X							X	X	X
7. Lands and grooves worn out		X	X		X						X	X	X
8. Oversize barrel		X	X								X	X	X
9. Barrel not centered		X	X								X	X	X
10. Notches on barrel worn	X	X	X	X	X	X		X		X		X	X
11. Tight chamber, lands too long	X	X	X	X							X	X	X
12. Excessive length of chamber		X	X		X	X		X	X			X	X
13. Loose headspace	X	X	X		X	X					X	X	X
14. Tight headspace		X	X								X	X	X
15. Chamber too short		X	X								X	X	X
16. Barrel rough or dirty or deformed		X	X								X	X	X
BARREL EXTENSION													
17. Burs in guide grooves		X	X								X	X	X
18. Barrel threads too tight (barrel has no play)		X	X				X				X	X	X
19. Barrel extension warped		X	X				X				X	X	X
20. Guide grooves for bolt too narrow		X	X								X	X	X
21. Barrel extension broken		X	X									X	X
22. Grooves for breech lock depressors burred		X	X								X	X	X
23. Barrel extension shank loose or bent		X	X									X	X
OIL BUFFER													
24. Oil buffer spring guide burred		X	X								X	X	X
25. Weak oil buffer spring		X	X								X	X	X
26. Broken oil buffer spring		X	X								X	X	X
27. Oil buffer piston rod bent		X	X								X	X	X
28. Bent or burred breech lock depressors		X	X								X	X	X
29. Burs on accelerator		X	X								X	X	X
30. Accelerator tips broken		X	X									X	X
31. Front end of oil buffer body burred		X	X								X	X	X
32. Piston rod adjustment from face of notch to valve head short		X	X								X	X	

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FAILURES

POSSIBLE CAUSES	Short round	Failed to fire	Failed to feed	Bullet pulls out of case	Separated case	Cartridge deformed or split near head	Tight headspace	Loose headspace	Loose headspace, cannot adjust	Headspace changes while firing	Action will not close	Action will not open properly	Fires a few rounds and stops	Gun is inaccurate	Fires one round and stops	Uncontrolled fire	Ruptured primer
BOLT ALTERNATE FEED																	
33. Worn firing pin striker		X											X		X		
34. Grease in firing pin recess		X											X		X		
35. Grease in firing pin extension		X											X		X		
36. Oversize firing pin striker		X											X		X		
37. Broken firing pin		X											X		X		
38. Grease in firing pin hole		X											X		X		
39. Oversize firing pin extension		X											X		X		
40. Shoulder on firing pin extension worn																X	
41. Shoulder on firing pin extension filed at angle																X	
42. Firing pin spring weak or broken		X											X		X		
43. Head of firing pin extension too long (no overtravel)		X											X		X	X	
44. Sear worn		X											X		X	X	
45. Sear broken		X											X		X	X	
46. Sear filed off at angle		X											X		X	X	
47. Sear spring weak		X											X		X		
48. Sear spring not in guide holes		X														X	
49. Sear spring broken		X														X	
50. Sear slide notch not deep enough																X	
51. Sear slide broken		X											X		X		
52. Sear slide too thick																X	
53. Sear stop broken		X											X		X		
54. Sear stop pin bent		X											X		X		
55. Cocking lever bent		X											X		X	X	
56. Cocking lever broken		X											X		X		
57. Cocking lever burred		X											X		X		
58. Heel of cocking lever worn		X											X		X		
59. Cocking lever too long		X											X		X		
60. Extractor arm bent		X	X										X		X		
61. Extractor claw worn or broken		X	X										X		X		
62. Extractor cam surface for cover extractor spring worn		X	X										X		X		
63. Extractor stop pin worn or broken	X	X	X								X		X		X		
64. Bolt switch stud missing		X	X								X	X	X		X		
65. Bolt switch stud too long		X	X										X		X		
66. Bolt switch assembled wrong		X	X												X		
67. Bolt stud recess in bolt not countersunk enough		X	X										X		X		
68. Burs on flange of bolt stud		X	X										X		X		
69. Bolt guide ribs too wide		X	X										X		X		
70. Firing pin hole enlarged			X										X		X		X
71. Face of bolt set back	X					X		X			X		X		X		
72. Driving springs weak or broken	X	X	X								X		X		X		
73. Driving spring rod bent	X	X	X								X	X	X		X		
74. Grease in driving springs	X	X	X								X		X		X		

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FAILURES

POSSIBLE CAUSES

	Short round	Failed to fire	Failed to feed	Bullet pulls out of case	Separated case	Cartridge deformed or split near head	Tight headspace	Loose headspace	Loose headspace, cannot adjust	Headspace changes while firing	Action will not close	Action will not open properly	Fires a few rounds and stops	Gun is inaccurate	Fires one round and stops	Uncontrolled fire	Ruptured primer
BOLT ALTERNATE FEED (Cont'd)																	
75. T-slot broken or burred		X	X										X		X		
76. T-slot too high	X	X	X										X		X		
77. Bolt stud too long		X	X										X		X		
78. Lock surface dented								X									
COVER ASSEMBLY AND FEEDING MECHANISM																	
79. Cover extractor cam burred		X	X										X		X		
80. Cover extractor cam worn		X	X										X		X		
81. Bolt feed lever pivot stud loose		X	X										X		X		
82. Bolt feed lever pivot stud worn		X	X										X		X		
83. Cover latch spring weak		X	X										X		X		
84. Cover latch spring broken		X	X										X		X		
85. Cover extractor spring weak		X	X										X		X		
86. Belt feed pawl spring weak		X	X										X		X		
87. Belt feed pawl spring not in guides		X	X														
88. Belt feed pawl short	X	X	X								X						
89. Belt feed pawl arm bent or broken		X	X										X		X		
90. Belt feed slide worn	X	X	X								X		X		X		
91. Belt feed lever bent	X	X	X								X		X		X		
92. Belt feed lever cam stud worn	X	X	X								X		X		X		
93. Belt holding pawl spring weak or broken		X	X										X		X		
94. Dirt under belt holding pawl		X	X										X		X		
95. Belt holding pawl spring not in guide holes		X	X														
96. Belt holding pawl pin oversize (freezes pawl in place)		X	X										X		X		
97. Belt holding pawl brackets loose	X	X	X														
98. Cartridge stops in wrong place	X	X	X														
99. Stripper too tight or lower prong too high		X	X										X		X		
100. Belt feed lever hits right side plate	X	X	X														
RECEIVER AND BARREL JACKET																	
101. Switch rusty	X	X	X								X	X	X		X		
102. Switch spring weak or broken	X	X	X								X	X	X		X		
103. Switch pivot nut loose	X	X	X								X	X	X		X		
104. Trigger bar bent down																X	
105. Trigger bar bent up		X											X		X		
106. Trigger bar pin key sheared		X											X		X		
107. Trigger bar pin lock broken		X											X		X		
108. Top plate bracket loose		X											X		X		
109. Top plate bracket recess for cocking lever undersize		X									X	X	X		X		
110. Insufficient side plate clearance		X	X								X	X	X		X		
111. Excessive side plate clearance (with trigger motor)	X												X		X		

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ALL TYPES

FAILURES

POSSIBLE CAUSES	Short round	Failed to feed	Failed to fire	Bullet pulls out of case	Separated case	Cartridge deformed or split near head	Tight headspace	Loose headspace	Loose headspace, cannot adjust	Headspace changes while firing	Action will not close	Action will not open properly	Fires a few rounds and stops	Gun is inaccurate	Fires one round and stops	Uncontrolled fire	Ruptured primer
RECEIVER AND BARREL JACKET (Cont'd)																	
112. Dirt in breach bearing		X	X								X	X	X		X		
113. Breech lock cam worn		X			X	X		X	X				X	X	X		
114. Breech lock cam too tight		X									X		X		X		
115. Breech lock cam burred		X	X								X	X	X		X		
116. Barrel jacket loose		X	X				X				X	X	X	X	X		
117. Barrel jacket bent		X	X				X				X	X	X		X		
118. Front barrel bearing burred		X	X				X				X	X	X		X		
119. Front barrel bearing undersize		X	X				X				X	X	X		X		
120. Trunnion undersize		X	X				X				X	X	X		X		
121. Trunnion adapter loose (wrong size shim)														X			
BACK PLATE																	
122. Tip of trigger broken off		X											X		X		
123. Buffer disks loose		X											X		X		
AMMUNITION																	
124. High primer																	X
125. Low primer		X											X	X	X	X	
126. Thin head	X	X									X		X		X		
127. Thick head	X	X	X								X	X	X		X		
128. Ammunition guide on turrets out of alignment	X	X	X	X							X		X		X		
129. Ammunition loaded unevenly in belt	X	X	X	X							X		X		X		
130. Bulged round in belt	X	X	X	X		X					X		X		X		
131. Ammunition corroded	X	X	X	X		X					X		X		X		
132. Ammunition feed box out of alignment	X	X	X	X							X		X		X		
METALLIC BELT LINKS																	
133. Frozen or tight links		X	X			X						X	X		X		
134. Sharp-edged links		X	X			X					X	X	X		X		
135. Weak links	X	X	X	X							X		X		X		
136. Broken links	X	X	X	X							X		X		X		
137. Single link of belt first	X	X	X	X							X		X		X		

38. BARREL.

a. **Inspect The Barrel As A Whole From The Standpoint Of Serviceability.** Check barrel locking notches for wear or breakdown. (This is very important as worn or damaged notches may permit the barrel to turn during firing, thus allowing headspace adjustment to change.) Accuracy of fire is the main point to consider when inspecting a barrel. Accuracy is reduced in varying degrees by bulges, erosion, and

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pits in the bore. The extent to which these defects will reduce accuracy is determined by two methods: namely, visual inspection and bore gaging. Before inspecting the barrel, all metal and other fouling must be removed and the barrel wiped dry. Instructions for cleaning are given in section IX of this manual.

b. Visual Inspection. Hold the barrel so that its interior is illuminated, and examine the bore from both the muzzle and breech ends. If the barrel is not bent or otherwise deformed, if the bore appears free from bulges and large pits, and if the lands are sharp and uniformly distinct, it is serviceable. Small pits will not render the barrel unserviceable, providing it is in good condition otherwise. Examine the breech end of the bore. If the lands are worn away so that the first 6 or 8 inches of the bore are smooth, the barrel is unserviceable and should be scrapped. If the barrel contains a bulge, it should be scrapped. A bulge is indicated by a shadowy depression or ring in the bore. It may also be detected often by a bulge or raised ring on the exterior surface. If the barrel is pitted to the extent that the sharpness of the lands is affected, or if it has a pit or pits in the lands or grooves large enough to permit passage of gas around the bullet (pits approximately $\frac{1}{2}$ to $\frac{3}{4}$ inch long and the width of one land), the barrel is, or soon will be, too inaccurate for serviceability and should be scrapped. Proper care and cleaning of the barrel as outlined in section IX of this manual usually will prevent such damage to the bore.

c. Bore Gaging.

(1) Each barrel inspected and found serviceable by visual test also will be checked by bore gaging. Remove the barrel from the gun and make sure the bore and chamber are thoroughly clean and dry. Examine the breech bore gage C20623 to insure that it is clean and moves freely in its sleeve. The presence of dirt, or any other obstruction, will prevent the sleeve from seating properly in the chamber, thus giving a false indication of the condition of the barrel. **CAUTION:** Never attempt to bore gage a hot barrel. As the barrel cools, the barrel will "freeze" on the gage and make it very difficult to remove the gage without damaging either the gage or the barrel. With the barrel in a horizontal position, insert the breech bore gage into the chamber with the long side of the sleeve down (fig. 104). Make sure that the sleeve is fully seated in the chamber. When properly seated, the face of the short side of the sleeve should be flush with the face of the barrel. If there is any excess length of chamber, due to stretching or otherwise, the short face of the sleeve will enter beyond the face of the barrel. Rotate the gage so that the figures are uppermost, and slide the gage into the bore until the slightly tapered forward section is in definite contact with the lands of the

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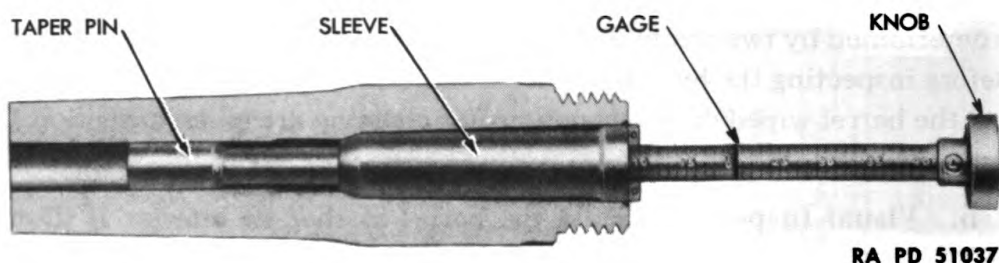


Figure 104—Breech Bore Gage In Barrel

rifling. The wear of the lands will be indicated by the distance the gage goes forward before contacting the lands. This distance will be indicated in tenths of an inch by the index line opposite the long end of the sleeve.

(2) When the erosion and wear of the barrel result in the gage entering the sleeve so that the red index line (twenty tenths, or 2.0 inches) comes opposite the long end of the sleeve, the resulting initial velocity has dropped approximately 200 feet per second. The barrel may still be fired several thousand rounds; however, considering reduced accuracy, cost of ammunition, etc., the barrel should usually be scrapped when in this condition. Barrels which permit the gage to enter to the thirteenth graduation or beyond, may be used for training but are not to be used in the theater of operations.

d. Disposition Of Unserviceable Barrels. Unserviceable barrel assemblies which have a sleeve assembled to the muzzle end may be disposed of locally after the sleeves are removed. These sleeves should be forwarded to Springfield Armory for reassembly to new barrels.

39. HEADSPACE AND TIMING.

a. When guns are reassembled after inspection, headspace and timing should be adjusted and carefully checked, using the procedure given in paragraphs 31 and 32.

40. WATER JACKET.

a. Check alinement of the water jacket, making sure the trunnion block lock is positioned in the rear end cap (M2 Gun). Test functioning of water jacket drain valve (water plug, M1921 Gun). Inspect for leaks, burred threads in reducing bushings, loose front sight base, burred threads on front end cap, missing front end cap thread cover, missing or loose front barrel bearing lock screw jam nut (M2 Gun), and loose front barrel bearing lock screw (M2 Gun). Remove muzzle gland (M1921

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Gun) and check for burred threads. Remove muzzle radiator (M1921A1 Gun) and check for damaged threads, carbon in bushing and radiator vents, loose or missing bushing lock screw, and missing or damaged lock washer. Inspect front and rear barrel packings but do not remove except for replacement. Test functioning of the steam tube (sliding type) by tipping the water jacket and listening for the sliding of the tube. Some guns of recent manufacture have a different type of steam tube rigidly mounted in the water jacket. Inasmuch as there are no moving parts, the only necessary inspection is for leaks in the water jacket. Such guns can readily be identified by the absence of the front steam tube support on the front end cap.

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Section VIII

MAINTENANCE AND REPAIR

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41. TOOLS FOR MAINTENANCE AND REPAIR.

a. The general tools needed for maintenance and repair are listed in the standard nomenclature list pertaining to this weapon, and are part of the standard equipment of an ordnance maintenance company. Tools of a special nature are listed in SNL A-35 and are carried by the small arms repair truck. Illustration and description of the special tools and gages for use with this weapon are included in section IV of this manual.

42. GENERAL INSTRUCTIONS FOR MAINTENANCE AND REPAIR.

a. The maintenance and repair of Browning machine guns, cal. .50, with their mounts and equipment consist largely of the replacement of worn or broken parts. The presence of such worn or broken parts will

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be revealed by a complete inspection of the weapon. Procedure for complete inspection is described in section VII of this manual. For detailed instruction on disassembling, assembling, or changing parts, refer to section VI of this manual.

b. When parts or assemblies, or parts of assemblies, are broken or worn so as to render them unserviceable, they must be replaced from stock. Often, only parts of assemblies will be worn or broken; however, when it takes more time to remove the serviceable parts from the assembly than the parts are worth, the entire assembly should be replaced.

c. In general, maintenance operations are of a first-aid nature, performed by qualified ordnance personnel with only the limited tool facilities afforded by repair trucks or by semipermanent shops at posts and camps, or by an inspector while making a regular inspection. Typical operations in the maintenance of these guns are described below.

43. BURS ON SCREW HEADS AND WORKING SURFACES.

a. During the entire life of the gun, polishing and stoning are necessary to relieve friction and to remove burs set up by firing. Burs on screw heads, threads and like surfaces should be removed with a fine file. Burs on such working surfaces as the cam grooves on top of the bolt, engaging surfaces of the sear slide, sear, and firing pin extension, and any roughness on working parts such as the accelerator, breech lock, breech lock cam, etc., should be removed with a fine grained sharpening stone. Stones of various shapes and sizes are included in the armorer's tool chest. Rounded contacting surfaces can be smoothed and polished with CLOTH; crocus.

CAUTION: Care should be observed to stone and file evenly and lightly, and not to remove more metal than is absolutely necessary. Parts or assemblies should never be altered in any way that would make such parts noninterchangeable.

44. BARREL.

a. Tight Chambers M2, All Types.

(1) Frequently, when extracting a live round by hand-charging, the bullet jams in the chamber, putting the gun out of action until the bullet is driven out of the chamber, and all trace of loose powder is removed. In most cases, this is caused by the following conditions:

- (a) New barrel with minimum size chamber.
- (b) Maximum round.
- (c) Loose bullet.

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(2) To avoid this malfunction, all cal. .50 machine gun barrels to be manufactured in the future will have the bullet seat located forward one-quarter inch in accordance with chamber and rifling drawing C64348, revised March 2, 1942. To correct barrels now in service, cal. .50 chamber reamers C121020 have been furnished to all ordnance maintenance personnel. Instructions for the use of the reamers were furnished with them.

(3) Pending the correction of barrels in service and in storage, the following precautionary measures must be taken, particularly where combat is anticipated.

(a) Inspect each round of cal. .50 armor-piercing ammunition by pulling on the bullet to determine if it is loose. Reject all ammunition with loose bullets.

(b) When practicable, use barrels that have fired at least 100 rounds in a continuous burst.

(c) If a new barrel is used, charge the gun manually, using a round of armor-piercing ammunition, to determine whether the bullet is engraved by the lands. If the bullet is engraved, the barrels should be fired a continuous burst of 100 rounds or reamed as prescribed in subparagraph (2), above.

(d) Hand-charging Of Guns With The Cartridge In The Chamber Should Be Held To A Minimum.

(4) Barrels to be manufactured in the future, and barrels now in ordnance storage to be modified in accordance with chamber and rifling drawing C64348, revised March 2, 1942, will be piece marked as follows:

(a) Aircraft barrels: D35348A-7 or D28272-9, depending on type.

(b) Heavy barrels: D28269-8, D28269-8X or D28253-11, depending on type. Piece mark D28269-8X is used on those barrels which are rechambered, as in the eighth revision of the drawing, but whose weight is not reduced from 29.5 pounds to 28 pounds.

(c) Water-cooled barrels: D28271-13.

b. Short Threaded Portion Of Barrel M2, All Types.

(1) It has been found that proper headspace adjustment cannot be obtained in some Browning Machine Guns, cal. .50, M2, all types, because of the inadequate length of the threaded portion of the barrel from the breech end to the stop shoulder. The barrel drawings for barrels manufactured to date specified that this dimension be 0.777 inch + 0.010 inch; however, barrels have been found that were manufactured with this dimension less than the minimum. When barrels are encountered with the above difficulty, they should be corrected as follows:

(a) If a lathe is available, cut the shoulder back until the proper dimension is obtained, as shown in figure 105.

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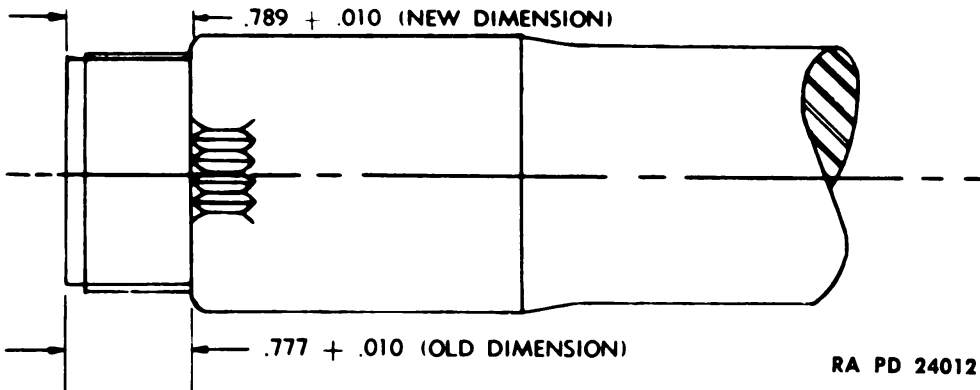


Figure 105—Modification Of Barrel M2, All Types

(b) If no lathe is available, the use of a file is authorized to cut this shoulder back. Filed surfaces should be smoothed down with a stone.

(c) If the barrels to be modified have notches cut in a hardened ring, the ring shall be ground to the proper dimension.

(2) Barrels now being manufactured have this dimension changed from 0.777 inch + 0.010 to 0.789 inch + 0.010 inch to insure sufficient reserve for headspace. All barrels manufactured to the 0.777 inch + 0.010 inch dimension will not be modified by increasing this dimension to 0.789 inch + 0.010 inch, but only those barrels in which the above difficulty is encountered.

45. EXCESSIVE WELD METAL ON BARREL JACKET.

a. It has been found that during manufacture of the barrel jacket assembly for the basic aircraft gun, an excessive amount of weld metal is left at the joint of the barrel jacket D28255, and the breech bearing B8921. This excess of metal does not in most cases cause difficulty in installation; however, when the guns are to be used in Air Corps adapters, types E-8, E-10, or E-12, the excessive metal interferes with proper mounting.

b. Figure 106 shows a barrel jacket assembly before correction, as outlined herein, and the condition of the fillet as it should be after correction. If facilities are available, the excessive metal should be removed in a lathe; however, in an emergency it can be removed by grinding or filing.

c. Correction should be made to this materiel only in cases where the existence of the excessive metal will cause difficulty in installation.

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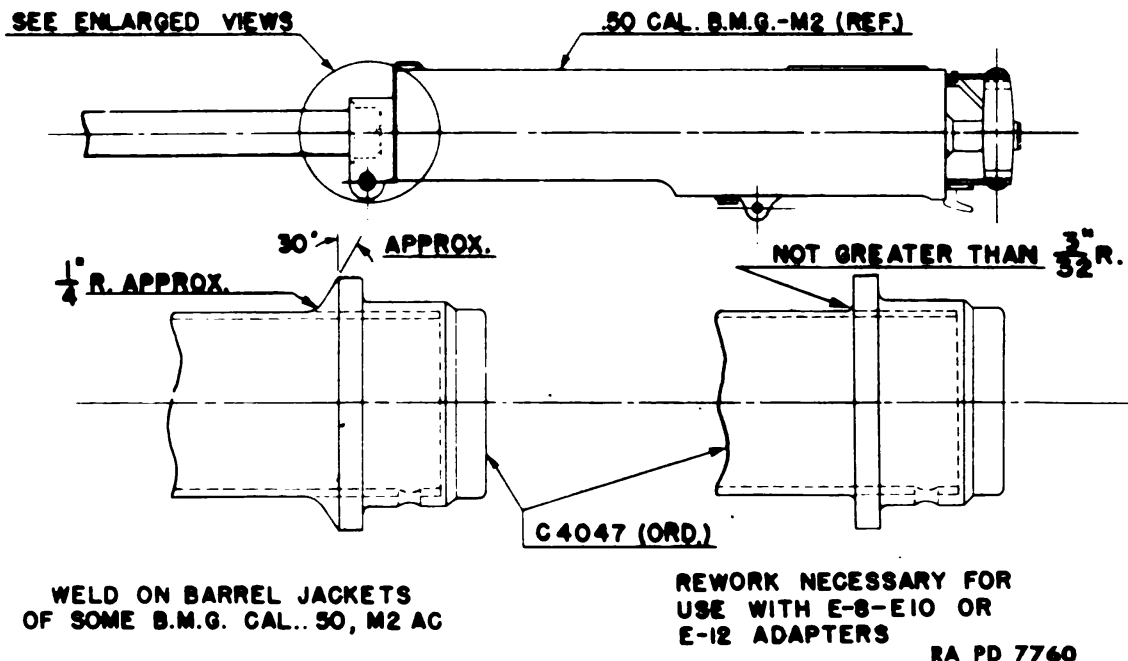


Figure 106—Excessive Weld Metal On Barrel Jacket

46. COVER EXTRACTOR CAM.

a. When cover extractor cam is found to be broken, drill out cover extractor cam rivets, taking care not to drill off center. Rivet new cover extractor cam in place. Test after repairing.

47. BENT BELT FEED LEVER OR WORN STUD.

a. Excessive wear on lug on rear end of belt feed lever, belt feed lever pivot stud, and front end of belt feed lever, or a bent belt feed lever will cause lost motion so that slide and pawl do not force cartridge fully against stops. The extractor will then hit rim of cartridge and drive case onto bullet without engaging groove on base of cartridge. Replace parts, or in emergency, in case of bent lever (if stud is not too worn), straighten lever. After repairing, test as described in paragraph 30 b, above.

48. BENT TRIGGER BAR.

a. If trigger bar is sprung down, so that it drags on the bolt when the trigger is depressed and the bolt is retracted (test with a 0.005-inch feeler gage) or there are burrs on beveled face of trigger bar, or on sear, the gun may revert to uncontrolled automatic fire. In this case replace parts, or in emergency, straighten bar and stone off burrs. After repairing, check timing as described in paragraph 32, above.

49. FIRING PIN BINDING IN BOLT.

a. In some cases the firing pins do not drop freely in the firing pin

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tunnel of the bolt. This condition may be corrected by reducing the 2 largest diameters of the firing pin. The largest diameter, which is 0.490 inch to 0.003 inch, may be ground to 0.482 inch to 0.005 inch. The portion that mates with the firing pin extension has a diameter of 0.342 inch to 0.003 inch, and may be ground to 0.337 inch to 0.005 inch. These changes provide a floating action for the firing pin even if it is not perfectly alined with the firing pin extension, and will in most cases overcome any minor defects made during the machining of the bolt. Firing pins of future manufacture will include these changes.

50. SIDE PLATE CORRECTIONS.

a. Providing Clearance For Belt Feed Lever M2, All Types.

(1) It has been noted that when Browning Machine Guns, cal. .50, M2, are arranged to feed from the left, the belt feed lever may strike the side plate. This difficulty may be overcome by milling away a portion of the metal, from the top of the right-hand side plate, immediately to the rear of the feedway. The cut should be 4.25 inch + 0.03 inch long and 0.17 inch + 0.01 inch deep. The cut should be taken from front to rear, terminating with a 1-inch radius or less. The metal to be removed is shown in figure 107.

(2) If facilities for milling the side plate are not available, grind away a small amount of metal from the belt feed lever. Only enough metal should be removed to overcome the interference. Guns now being manufactured have metal removed from the top of the right-hand side plate and interference will not be experienced. Only guns in which interference is encountered should be corrected.

b. Burred Side Plates And Bolt Studs.

(1) It has been noted in several cases, due to an unfavorable combination of manufacturing tolerances, that the bolt stud rides the lower portion of the slot in the side plate. This condition causes a bur to be set up at the bolt stud insertion hole. In some cases, the bur will cause the bolt to bind in the receiver. In other cases, the bolt stud will break.

(2) On guns where the bolt stud is dragging the lower portion of the slot in the side plate, the side plate may be filed until it does not contact the bolt stud. After filing for clearance, the inside edge of the slot should be slightly beveled, to remove the possibility of burs recurring. The amount to be removed should in all cases depend on the amount of interference. Only enough metal should be removed to eliminate the interference of bolt stud and side plate. The amount removed should not exceed 0.010 inch in any case.



Figure 107 – Modification Of Right-Hand Side Plate, M2 Gun

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c. **Switch Binds On Side Plate.** If the switch of new guns cannot be properly adjusted, the inside of the switch nut should be countersunk $\frac{1}{32}$ inch by 60 degrees with the point of a drill. This will allow the proper adjustment to be made.

51. EXCESSIVE PLAY BETWEEN SEAR AND SEAR SLIDE.

a. Normally, the upward travel of the sear is limited by either the sear slide or the sear stop assembly. If parts are worn to the extent that the upward travel of the sear is instead being limited by the firing pin extension, then a new sear slide, sear, and/or bolt should be used.

52. PARTS REQUIRING MOST FREQUENT REPLACEMENT.

a. The parts requiring replacement due to wear or breakage can be determined only by a complete inspection as outlined in section VII of this manual. The parts listed below, however, are subject to greater wear and more frequent breakage, and should receive particular inspection each time the weapon is disassembled. This list includes firing pin, firing pin extension, sear, extractor, ejector, ejector pin, belt feed lever, belt feed slide, belt feed pawl arm, accelerator, and breech lock cam. See paragraph 53 regarding breech lock cam replacement. All springs should be checked carefully to insure that they have the proper tension and are assembled properly in the gun.

53. BREECH LOCK CAM REPLACEMENT.

a. The breech lock cam used on Browning Machine Gun, cal. .50, M2 was revised June 12, 1940, by increasing the width of the lug that fits into the bottom plate from 0.740 inch—0.005 inch to 1.505 inch—0.005 inch. This necessitated increasing the breech lock cam cut in the bottom plate from 0.763 inch + 0.005 inch to 1.533 inch + 0.005 inch. Due to this change, breech lock cams of present manufacture will not fit bottom plates of early manufacture. Therefore, when breech lock cams with this larger lug are issued for assembly to bottom plates with the smaller cut, the following modification is necessary and authorized:

(1) File, grind, or mill the breech lock cam cut in the bottom plate to the dimension given in paragraph 53 b, below.

(2) This modification is to be applied only when breech lock cams with larger lugs are issued for replacement on guns manufactured with the smaller breech lock cam cut in the bottom plate. Replacements will be made, as far as possible, with the same type cam as originally used on the gun. Revision of the cam cut in the bottom plate will be made only when necessary.

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b. The following are the dimensions and piece marks of the breech lock cam lugs and bottom plate recesses that have been used on all cams manufactured to date:

Piece Mark	Item	Dimension	Remarks
B8956	CAM, breech lock, assembly	0.624 in. — 0.005 in. x0.740 in. — 0.005 in.	Some were incorrectly stamped C4063 (B, fig. 108). Superseded by B147545.
B147545	CAM, breech lock, assembly	0.626 in. — 0.001 in. x1.505 in. — 0.005 in.	Some were incorrectly stamped B8956 (A and C, fig. 108). Superseded by B147583.
B147583	CAM, breech lock, assembly	0.625 in. — 0.002 in. x1.505 in. — 0.005 in.	Latest type. Some were incorrectly stamped B8956 and others B147545-O. (D, fig. 108.)
D28257	PLATE, bottom	0.626 in. + 0.002 in. x0.763 in. + 0.005 in.	Early type.
D28257	PLATE, bottom	0.626 in. + 0.002 in. x1.533 in. + 0.005 in.	Present type.

54. OIL BUFFER ASSEMBLY.

a. Leaky Oil Buffer Tubes.

(1) The original oil buffer packing was of the conical type A9279 and $\frac{31}{64}$ inch in diameter. This packing was assembled on the piston rod with a gland ring and spring preceding it in the order named. Later this was changed to packing A9279A and given a diameter of $\frac{9}{16}$ inch and assembled in the reverse order, that is, the packing was assembled to the piston rod ahead of the ring and spring in the order named. Recently designed packing A152162 is cylindrical in shape and slightly over $\frac{9}{16}$ inch in diameter, and is assembled with a washer A153161 and spring A153163 in place of the original ring and spring used with the 2 earlier types of packing. This new (cylindrical type) packing is assembled to the piston rod first, followed by the washer and spring, as in the case of the A9279A packing shown in figure 74. Where leaky oil buffer tubes are encountered, pending the availability of the new larger A153162 packing, the leaky condition can be corrected in many cases by assembling packing as shown in figure 74, if it is not already so assembled.

(2) Some difficulty has also been encountered with leakage around the oil buffer filler screw. This is due to improper seating of the nose of the filler screw in the oil buffer body. To correct this condition, filler screws to be manufactured in the future will be left soft at the front end. Difficulty has been encountered in removing the filler screws from the oil buffer tube. In cases where this condition exists, a small drift

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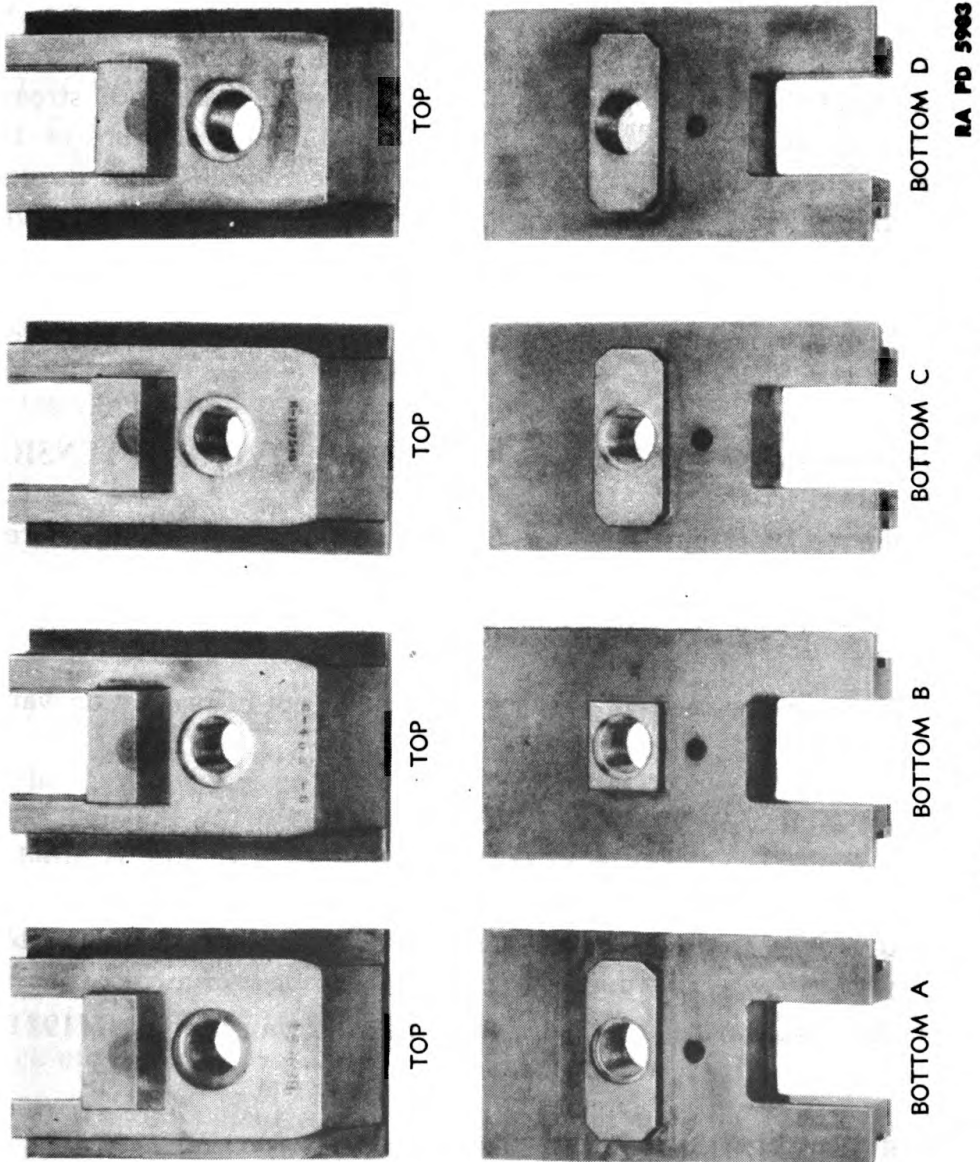


Figure 108—Types Of Breech Lock Cams

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can be placed against the head of the filler screw, and tapped lightly to remove the screw.

b. Filling The Oil Buffer. The oil buffer must be kept filled with oil, as the gun will not function properly if there is insufficient oil to absorb the recoil. In the case of heavy barrel models, however, the oil is completely omitted (refer to paragraph 63 g and figure 112 for details). In filling the oil buffer, be sure to use only OIL, recoil, light. Remove both filler screws from the back of the oil buffer tube. Press the bottom of the oil can, and when the oil is flowing in a steady stream, insert the spout into one of the filler holes. Maintain pressure on the oiler, and remove the spout from the hole while the oil is still flowing. Repeat this operation, if necessary, until the oil flows from the other filler hole. This procedure must be followed to avoid getting air bubbles in the tube. If slots or seats of filler screws appear damaged, use new screws. Replace both filler screws in tube, drawing them tight to avoid leakage.

**55. LOOSE REAR SIGHT MOVABLE BASE PIVOT OR TENSION
SPRING STUD.**

a. Remove rear sight movable base from fixed base. Remove rear sight fixed base screws. Turn base upside down with pivot or stud resting on a hardwood or lead block. Use a center punch to tighten pivot and/or stud in place.

NOTE: Combination rear sights will normally not be present on water-cooled guns.

56. LOOSE REAR SIGHT FIXED BASE.

a. When the rear sight fixed base is found loose, it should be lifted by removing rear sight fixed base plate from top plate, and the fixed base screws tightened from the underside. Replace fixed base and fixed base plate on top plate. Test functioning of movable base after repairing.

NOTE: This construction is common only to water-cooled M1921A1 Guns.

57. FRONT SIGHT OUT OF ALINEMENT.

a. Place gun on 1,000-inch target range, having a target marked off with a vertical line 1 inch wide and 20 inches long. With the combination rear sight set at 700 yards, and the windage on "ZERO," aline gun on center of target and fire a burst of 10 rounds. If shots go to right of line, loosen front sight set screw, and turn front sight adjusting screw in a clockwise direction. If the shots go to the left of the line, the adjusting screw should be turned in a counterclockwise direction. Tighten front

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sight set screw, relay, reload, and fire. Repeat this operation until proper alinement is obtained.

NOTE: This sight is common to water-cooled guns only.

58. REPLACING BUFFER DISKS.

a. Proper functioning of the gun requires that the buffer plate should project from the front of the back plate approximately $\frac{3}{16}$ inch. The adjusting screw must be kept tight at all times using combination wrench D28242. If the adjusting screw can be tightened until the face of the screw is flush with the end of the tubular section of the back plate, it is an indication that an additional buffer disk should be added to those in use. When adding a disk, remove the adjusting screw, taking care not to lose the plunger and spring, and take out the buffer disks and buffer plate. Remove any burs found on the buffer plate. Remove any rough edges from the buffer disks and replace any disks showing signs of disintegration. Install buffer plate and insert the buffer disks, one at a time, making sure that each is properly seated. Set the adjusting screw tightly, using combination wrench.

59. WATER JACKET LEAKS.

a. When leaks are due to porous metal or small seams, clean the surface with a fine file, or open seam slightly, and solder carefully with hard solder. Clean and paint surface affected to prevent rusting. In case of damaged threads of reducing bushings, necessitating replacement of bushing, heat with torch before attempting to remove, as these bushings are usually sweated in.

b. **Leaks Between Water Jackets And Trunnion, M2 Guns.** If a leak develops at the threaded connection between the water jacket and the trunnion, it will be necessary to disassemble these parts as outlined in paragraph 24 c. After disassembly, the threads should be thoroughly cleaned and coated with white lead. Reassemble parts. It may be necessary to use a thicker shim between the water jacket and the trunnion block, to insure that the parts are tight when the trunnion block lock engages in its recess.

c. **Leaks Between Water Jacket And Trunnion, M1921A1 Guns.** To rectify this condition, disassemble and reassemble the parts, following the procedure given in paragraph 24 d.

60. STICKING STEAM TUBE.

a. Most water-cooled guns (except those of very recent manufacture which have a fixed steam tube) embody a sliding steam tube which must move easily for proper functioning of the gun. If the tube sticks and fails

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to slide easily on the tube supports when the gun is tipped, remove the assembly from the water jacket, disassemble and clean the tube and supports; assemble and replace. Instructions for disassembly and assembly are given in paragraph 24 c and d.

61. ADJUSTING BARREL PACKING.

a. When leakage occurs at the front or rear barrel packing, the packing should be adjusted. If this fails to stop the leakage, the barrel will have to be repacked. This refers to water-cooled M2 Guns.

b. Adjust the front barrel packing (muzzle packing) by loosening the front barrel bearing lock screw jam nut and front barrel bearing lock screw. Use combination wrench (fig. 89) to loosen or tighten the muzzle gland as required. Tighten the front barrel bearing lock screw and front barrel bearing lock screw jam nut.

c. Adjust the rear barrel packing (breech packing) by tightening or loosening the packing adjusting ring. To do this, the barrel is drawn backward only enough to expose the barrel locking notches, leaving the packing still within the trunnion. The barrel holding wrench A152640 is inserted between the barrel and the receiver side plate so as to engage the barrel locking notches and keep the barrel from turning (fig. 109). The packing ring adjusting wrench A152639 is then engaged in the holes in the packing ring to turn the ring. Turning the ring in a clockwise direction when facing the breech end of the barrel tightens the ring against the packing. Do not tighten the ring too tightly as it will cause the packing to bind.

NOTE: The rear barrel packing of M1921 and M1921A1 Guns cannot be adjusted, as these barrels have no packing adjusting ring. Limited adjustment of the front barrel packing is possible by adjustment of the muzzle gland (M1921 Gun) or muzzle radiator (M1921A1 Gun).

62. PACKING BARREL.

a. The packing used on water-cooled M2 Guns is formed to dimensions. Inside diameter of rear packing is 1.45 inches \pm 0.010 inch (A152638), and of the front packing is 1.575 inches \pm 0.010 inch (A135710). Remove barrel assembly from the gun before packing.

(1) **TO PACK BREECH END.** Unscrew packing adjusting ring, using packing ring adjusting wrench A152639, and remove the old rear barrel packing. Clean the recess in the barrel and insert new rear barrel packing A152638. Smooth barrel packing until the ends meet. This can be done with a piece of flat metal wide enough to span the packing recess. Never cut off any of the packing, as the entire amount of formed packing

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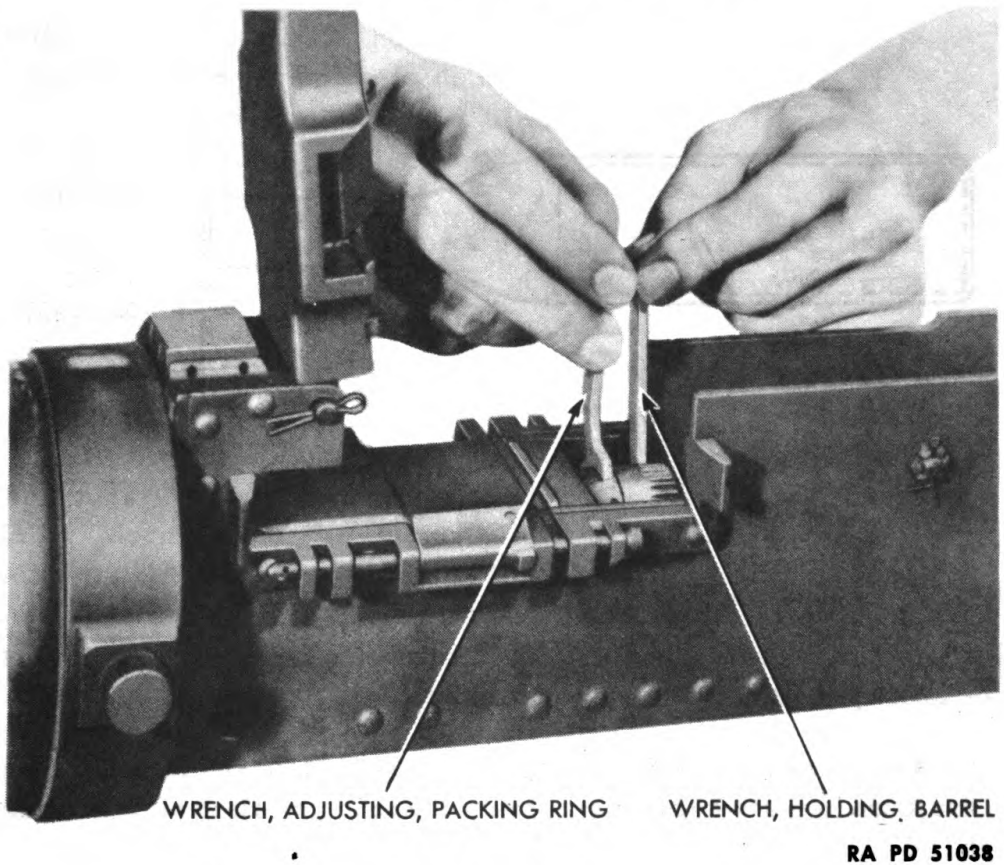


Figure 109—Adjusting Packing On Barrel

must be used to insure against water leaks. Screw the packing adjusting ring lightly against the packing to hold it in place.

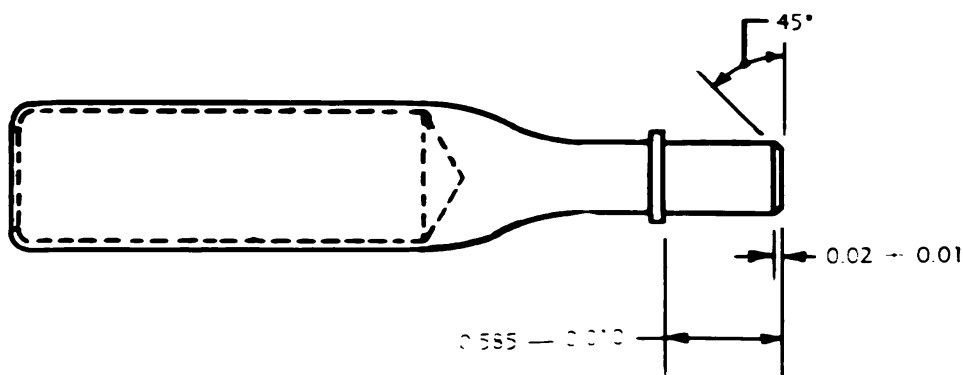
(2) **TO PACK MUZZLE END.** Unscrew the front barrel bearing lock screw jam nut and front barrel bearing lock screw. Unscrew and remove muzzle gland using combination wrench (fig. 89). Remove muzzle packing ring and old front barrel packing. Clean out inside of the front barrel bearing. Insert new front barrel packing A135710 and replace muzzle packing ring and muzzle gland. Screw muzzle gland lightly against the ring and packing, as the gland will be adjusted and locked in place after the barrel is reassembled in the gun. Reassemble the barrel assembly into the gun, being careful not to injure the barrel packing.

b. Adjust the front and rear barrel packing, following the instructions given in paragraph 61.

63. MISCELLANEOUS.

a. **Revision Of Oil Buffer Tube Lock Spring M1921.** In some cases oil buffer bodies C8062 of one manufacture will not accommodate oil buffer tube lock springs B9726 of another manufacturer. This is caused by excessive metal on the spring at the lugs which fit the

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RA PD 50598

Figure 110—Bolt Handle, M2 Gun, All Types

T-slot in the oil buffer body. In such cases, file or grind the oil buffer tube lock spring until it fits the oil buffer body.

b. Countersinking Of Driving Spring Rod Hole On Rear Of Bolt.

It has been reported that some bolts D28256 for Browning Machine Gun, cal. .50, M2 have been issued without the 60-degree countersink at the opening of the driving spring rod hole on the rear of the bolt. The omission of this countersink will not prevent the gun from firing, but will affect the rate of fire and also cause the driving spring to wear because of binding as it enters the hole. Bolts encountered with this defect should be corrected by scraping or filing a 60-degree bevel approximately $\frac{1}{32}$ inch wide on the edge of the hole with a metal scraper or half-round file.

c. Revision Of Bolt Handle. Several cases have been encountered where proper functioning of Browning Machine Gun, cal. .50, M2, all types, is prevented by excessive length of stud on bolt handle B8583. If the stud is too long, it will extend too far into the gun and will prevent movement of the sear. This condition will exist in a very small number of bolt handles. When it is encountered, it should be overcome by grinding the bolt handle to within the dimensions shown on figure 110.

d. The Cartridge Stops And Link Stripper or Right-Hand Rear Cartridge Stop Assembly. These parts must have a free fit in the trunnion block. Play of 0.001 inch is desired. If the fit is snug, the mating part must be filed until the desired freedom is obtained. In some cases the link stripper will bind due to dirt or burrs in its groove in the trunnion block. All sharp edges and burrs should be removed from the slot and

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the feedway. The bottom of the lower prong of the link stripper must not extend above the rib in the trunnion block.

e. Incorrect Serial Numbers And Necessary Modifications To M2 Aircraft Guns.

(1) The first Browning Machine Guns, cal. .50, M2, aircraft, manufactured by the High Standard Manufacturing Company, are marked as shown below:

Colt Aircraft Machine Gun
Browning Type
Model MG 53-2 Caliber .50

This marking is erroneous, and the guns should be carried on records as:

GUN, Machine, Cal. .50, Browning, M2, Aircraft-Basic

The serial numbers of guns marked erroneously are 151,125 to 162,799, both numbers inclusive. When any of the above guns are received in an ordnance shop for overhaul, the markings should be changed by eliminating the superfluous wording and adding the designation "M2" as shown below:

Machine Gun
Browning
Caliber .50 M2

(2) It has also been found in a good many of these guns that the trigger bar pinhole in the top plate bracket C4070 was not finish reamed to 0.267 ± 0.002 inch at assembly as required. Also, shoulder on top plate bracket stud A9367 is improperly located, which decreases space between bracket C4070 and head of stud sufficiently to prohibit assembly of trigger bar. This dimension should be 0.190 inch. If these guns are used in flexible installations, the trigger bar pinhole in top plate bracket must be reamed to 0.267 ± 0.002 inch, and head of top plate bracket stud must be filed to provide space of 0.190 ± 0.005 inch. These guns can be used for fixed installations without reaming or filing, and should be so installed where practicable. The affected guns are numbered from 151,125 to 159,024. Requisitions for the reamers should be submitted to Springfield Armory.

f. **Modification Of Belt Feed Lever Slot In Cover M2, All Types.** Interference sometimes exists between the forward end of the belt feed lever and the sides of the slot in the cover through which it operates. This condition causes excessive wear of the belt feed lever diamond and also limits the travel of the belt feed slide. The dimension of this slot, as now being manufactured, is 1.802 inches ± 0.010 inch; however, there were some covers manufactured with slots 1.691 inches ± 0.010 inch.

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When covers with narrow slots are encountered, the difficulty should be corrected by filing the sides of the slot so that the length will agree with the present dimension as shown in figure 111. Under no circumstances should any metal be removed from the belt feed lever diamond in eliminating this interference. If, after performing the above modification, the diamond does not align properly with the camway in the bolt, the diamond can be positioned by manipulating the belt feed slide while closing the cover.

g. Removal Of Oil And Parts From Oil Buffer M2, Heavy Barrel Gun.

(1) The reserve energy necessary to operate the automatic mechanism of the Browning Machine Gun, cal. .50, M2, heavy barrel, can be increased by removing the oil and several components from the oil buffer. This additional reserve energy aids the gun in overcoming unusual loads such as those imposed by severe weather conditions or by poor adjustment. When stoppages due to short recoil are encountered, the following components should be removed from the oil buffer:

Piece Mark	Item	Quantity
A9279A	PACKING, oil buffer gland	1
A9297	RING, oil buffer packing gland	1
A9360	SCREW, oil buffer relief valve	1
A9361	SCREW, filler, oil buffer tube	2
A9299	SPRING, oil buffer packing gland	1
A9393	SPRING, oil buffer relief valve	1
A9528	VALVE, relief, oil buffer	1

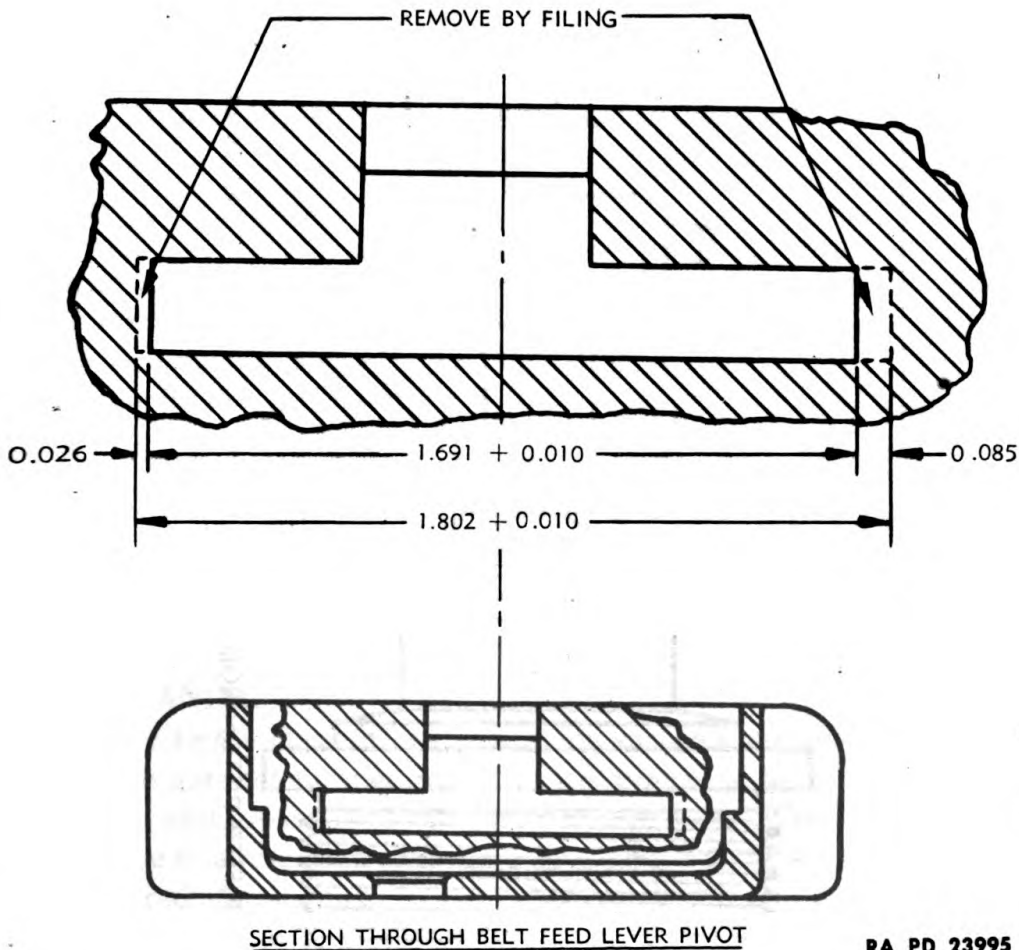
(2) The oil buffer packing gland plug A9277 must be replaced after removing the above components, as it acts as a guide for the oil buffer piston rod. Care must be taken to insure that the oil buffer piston is reassembled to the oil buffer piston rod in the exact position it had prior to disassembly; that is, the piston must be screwed on the piston rod the same number of turns it was originally. The proper adjustment is shown in figure 112.

(3) Components removed should be turned in to the local Post Ordnance Officer, who will forward them to Raritan Arsenal.

h. Correction Of Short Oil Buffers.

(1) Some oil buffers for Browning Machine Guns, cal. .50, M2, all types, have insufficient over-all length, thus causing erratic performance. It has been found that a gun equipped with a short oil buffer, even though correctly timed when on the bench, will stop firing after a few rounds if the gun is elevated.

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RA PD 23995

Figure 111—Modification of Belt Feed Lever Slot In Cover, M2 Gun, All Types

(2) In order to detect a short oil buffer, remove the driving spring from the gun and open the cover. Elevate the gun to 90 degrees and notice if there is a gap between the barrel extension and the trunnion block. There should be no gap between these components.

(3) When a short oil buffer assembly is found, it should be disassembled, and the oil buffer piston rod B9830 repositioned to increase over-all length of the oil buffer. The over-all length should be between 6.525 and 6.553 inches. If the oil buffer piston rod is such that the cotter pin-hole at the rear will not allow insertion of the cotter pin after the proper over-all length of the buffer has been obtained, it should be discarded. A new oil buffer piston rod assembly B8763 should be used. Piston rod assemblies of new manufacture are of the correct length.

(4) If neither of these adjustments proves satisfactory, the entire oil buffer assembly should be discarded and a new assembly C4077 used in its place.

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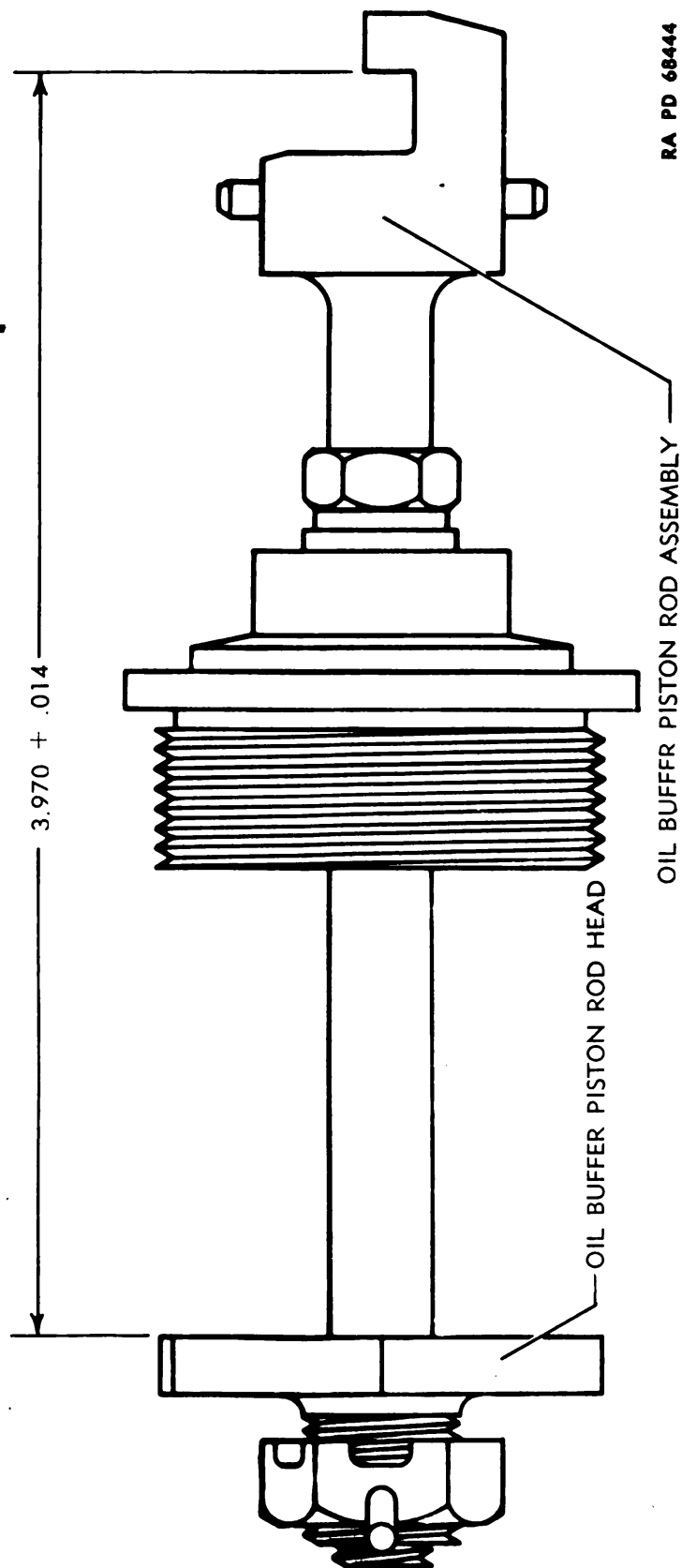


Figure 112—Adjustment Of Oil Buffer Piston

Section IX

CLEANING, LUBRICATION, AND DECONTAMINATION

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64. GENERAL.

a. Constant vigilance is absolutely necessary in the cleaning and lubrication of a machine gun to insure that it will fire, and keep on firing, when needed. Particular attention must be paid to the barrel, especially the bore.

65. CLEANING.

a. Due to the close fit of the working surfaces and the high speed at which the gun has to operate, all surfaces must be kept free from burs, rust, dirt, and grease if the gun is to fire properly. This is doubly true in the case of aircraft weapons because of the wide range of temperatures encountered during flight. Because of the differences in methods employed, cleaning will be discussed under: Guns received from storage, and guns which have been fired.

b. Cleaning Guns Received From Storage.

(1) When received from storage, most guns are completely covered with COMPOUND, rust-preventive, heavy. Regardless of the method employed, it is essential that all traces of the rust-preventive compound shall be removed from all surfaces of the weapon. Particular care must be taken to insure that all springs, holes, and recesses in which springs and plungers operate are thoroughly cleaned.

(2) COMMERCIAL DEGREASERS. When large numbers of guns are to be degreased at frequent intervals, various types of equipment have been developed to handle this operation quickly and efficiently. With such equipment, the gun is disassembled, parts placed in wire basket (parts for each weapon must be kept together), and the parts are degreased by following the directions set up for the particular equipment being used. The oil buffer assembly and back plate assembly should be degreased by other means (SOLVENT, dry-cleaning, brush). After parts are cleaned, they should not be touched by bare hands until they have received a coating of oil or rust-preventive compound. (Cloth gloves must be worn.) All gun components must be lubricated immediately after cleaning (par. 66).

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(3) **BOILING WATER CONTAINING SOAP, SODA ASH, OR BORAX.** To clean a gun by this method, disassemble the gun *completely*, and place all the small components in a wire basket; lower the basket along with the barrel and receiver in the vat containing the boiling water until completely immersed. Skim the rust-preventive compound off the top of the water to insure that particles of it will not adhere to the clean gun components when these are removed from the bath. Remove the gun components from the bath after approximately half an hour and dry thoroughly with clean, lintless rags. Wear cloth gloves.

CAUTION: Never use water and lye, or any caustic to clean gun components. All gun components must be lubricated immediately after cleaning (par. 66).

(4) **SOLVENT, DRY-CLEANING.** SOLVENT, dry-cleaning, is recommended but if it is unavailable, **CARBON TETRACHLORIDE** may be used in an emergency. Both are usually applied with a brush or with rag swabs to large parts, and as a bath to small parts in a wire basket. After using a solvent, make sure it is completely removed from all parts by wiping thoroughly with a clean lintless cloth. Make sure the bore, barrel chamber, and firing pin tunnel in the bolt are thoroughly cleaned. Precautions should be taken for proper ventilation and fire prevention when using toxic or inflammable solvents. All gun components must be lubricated immediately after cleaning (par. 66).

c. **Cleaning Guns Which Have Been Fired.** Formerly it was thought that corrosion in the bore of small arms might be due to the action of powder gases actually squeezed into the pores of the metal. Investigation has shown that this is not the case. The bore of a small arm, under the action of pressure and heat from burning powder gases, is hardened in a manner similar to that which forms the so-called case-hardened surface on steel. Under the further action of heat, pressure, and abrasion, the hardened surface becomes covered with extremely small cracks. These cracks normally follow the tool marks. They extend, however, from the surface of the bore to a depth approximately a maximum of 0.0015 inch. These small cracks accumulate fouling which is difficult to remove by merely wiping. A bore might, after quick cleaning, appear to be in perfect condition, but subsequently will rust from the action of fouling and moisture remaining in these cracks. Firing a cartridge deposits in the bore the combustion products of powder and primer, together with plating or smears of metal from the jacket of the bullet. Combustion of the powder, being nearly complete, usually leaves a fouling of an almost harmless ash. Combustion of the primer mixture, however, deposits a salt known as potassium chloride, similar to common table salt. This salt is deposited over the surface of the bore, as well as

CLEANING, LUBRICATION, AND DECONTAMINATION

in all cracks and tool marks. When first deposited it is harmless, but it quickly absorbs moisture from the air. Steel rusts very quickly when covered with wet salt. **NOTE:** This salt is not dissolved by oil and will continue to absorb moisture even when saturated with oil. It is, however, readily dissolved by **CLEANER**, rifle bore, or water. *Immediately* after firing, disassemble the gun, saturate a clean patch with **CLEANER**, rifle bore, and push back and forth through the bore several times with a cleaning rod. The rod should be inserted from the *breech* end. Repeat this operation, using new patches until a clean patch can be passed through the bore without soiling. Apply oil or rust-preventive, as directed in paragraph 66.

(1) If **CLEANER**, rifle bore, is not available, submerge *muzzle* in a vessel containing hot water and issue soap, **SODA ASH** solution, hot water alone, or, in the absence of these, cold water. Insert the cleaning rod, with a cloth patch assembled, in the breech and move up and down for about one minute, pumping the water in and out of the bore. While the bore is wet, run a brass or bronze wire brush, if available, completely through the bore and then all the way back, 3 or 4 times. Again pump water through the bore with the cleaning rod and cloth patch. Then wipe the cleaning rod dry, remove the barrel from the water, and with dry clean flannel patches swab the bore until it is perfectly dry and clean. Be certain the chamber is also dried and cleaned, using flannel on a stick if necessary. Finally draw a patch smoothly through the bore and out of the chamber, allowing the cleaning rod and patch to turn with the rifling. Apply oil or rust-preventive, as directed in paragraph 66.

(2) Wipe receiver clean and be sure no dirt is under breech lock cam, switch, belt holding pawl and rear right-hand cartridge stop. Thoroughly clean cover and belt feed mechanism, bolt, barrel extension, oil buffer, and back plate. All gun components must be lubricated immediately after cleaning (par. 66).

CAUTION: **CLEANER**, rifle bore, will freeze at temperatures below 32 F. If frozen, it must be thawed and shaken well before using. Closed containers should not be filled to more than 75 percent of capacity in freezing weather. Completely full containers will burst when contents freeze.

66. LUBRICATION AND RUST PREVENTION.

a. When parts are cleaned they should not be touched with bare hands until they have received a coating of oil or rust-preventive compound. Cloth gloves must be worn. If cloths are used to wipe parts, they should be clean, dry, and lintless.

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b. If gun is to be used immediately or within 20 days, oil all parts with light coating of OIL, lubricating, preservative, special (aircraft guns), or light (ground guns). For use below 0 F, parts should be wiped with a clean, lintless, slightly oiled cloth and then completely wiped with dry, clean, lintless cloth. Guns in this condition must be watched very closely for rust, and cleaned and reoiled as frequently as necessary.

c. When guns are to be stored for less than one year, they should be thoroughly cleaned on 3 successive days, as described in paragraph 65, and then coated with COMPOUND, rust-preventive, light.

d. When guns are to be stored for one year or longer, they should be thoroughly cleaned on 3 successive days as described in paragraph 65, and then coated with COMPOUND, rust-preventive, heavy.

67. NEW METHOD OF PACKING.

a. At the time of preparation of this manual, one manufacturer was using a new method of packing the cal. .50, M2 Gun, aircraft, basic. The application of COMPOUND, rust-preventive, heavy, has been discontinued. The gun is boxed in a wooden box on a wooden cradle, and is protected against rust by enclosing it in moistureproof envelopes which have been properly sealed. A drying agent has been placed within the envelopes to absorb the small amount of moisture which may eventually enter. Each gun has been properly lubricated with OIL, lubricating, preservative, special. Therefore, no further oiling prior to firing will be required. Guns so packed are adjusted and are ready for firing.

68. PROTECTIVE MEASURES AGAINST CONTAMINATION.

a. For materiel in constant danger of gas attacks, whether from chemical clouds, chemical shells, or chemical sprays, care should be taken to keep all unpainted metal parts of gun, mountings, instruments, and accessories well coated with oil.

69. DECONTAMINATION OF MATERIEL.

a. Commence by freeing the objects of dirt, lumps of earth, and liquid with wooden spatulas, rags, etc., which will be burned or buried immediately after this operation. Care must be taken to protect personnel against vapors arising from burning rags or other materials used.

b. Gun bores should be swabbed out with strong soap and water, dried thoroughly, then lubricated in accordance with paragraph 66.

c. Exposed ammunition should be cleaned with AGENT, decontaminating, noncorrosive (chloride of lime), or if this is not available, with strong soap and cool water. Corroded ammunition should either be cleaned thoroughly or discarded.

d. For further information on decontamination, see TM 9-850.

Section X

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70. STANDARD NOMENCLATURE LISTS.

a. Cleaning, Preserving, And Repair.

Cleaning, preserving and lubricating materials; recoil fluids, special oils, and miscellaneous related items	SNL K-1
Soldering, brazing and welding material, gases and related items	SNL K-2

b. Gun Materiel.

Gun, machine, cal. .50, Browning, M1921, air- craft—fixed and flexible	SNL A-20
Gun, machine, cal. .50, Browning, M1921 and M1921A1, water-cooled, and mounts	SNL A-2
Gun, machine, cal. .50, Browning, M2, aircraft, basic	SNL A-38
Gun, machine, cal. .50, Browning, M2, heavy barrel—fixed and flexible, and ground mounts	SNL A-39
Gun, machine, cal. .50, Browning, M2, water- cooled—flexible, and mounts	SNL A-37

c. Tools.

Tools, maintenance, for repair of automatic guns, automatic gun antiaircraft materiel, auto- matic and semiautomatic cannon, and mor- tars	SNL A-35
Truck, small arms repair, M1	SNL G-72

Current Standard Nomenclature Lists are as tabu-
lated here. An up-to-date list of SNL's is main-
tained as the "Ordnance Publications for Supply
Index" OPSI

71. EXPLANATORY PUBLICATIONS.

a. Cleaning, Preserving, Lubricating, And Repair.

Cleaning, preserving, lubricating, and welding materials and similar items issued by the Ord- nance Department	TM 9-850
General lubrication instructions, small arms	OFSB 6-3

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b. Gas Attack.

Decontamination, 1941	TC No. 38
Defense against chemical attack	FM 21-40
Military chemistry and chemical agents	TM 3-215

c. Gun Materiel.

Browning machine gun, cal. .50, M2, aircraft— fixed and flexible	TM 9-225
Browning machine gun, cal. .50, HB, M2, ground	FM 23-60
Browning machine gun, cal. .50, HB, M2 (mounted in combat vehicles)	FM 23-65
Browning machine gun, cal. .50, M2, water- cooled, and mounts	TM 9-226

d. Inspection And Maintenance.

Field inspection of ordnance materiel by service command inspectors in continental United States	TB 1100-1
Maintenance of materiel in the hands of troops.	OFSB 4-1

**e. Markmanship and service of the piece—antiair-
craft machine gun**

FM 4-135

f. Ordnance Storage And Shipment.

Introduction to ordnance storage and shipment charts	IOSSC—(a) (b)
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(For explanation of symbols; see FM 21-6)

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